4.3.4 Remedy-ILM (Inventory, Logistics and Maintenance {ILM} Manager)

ILM helps the DAACs and the EDF maintain records that describe all inventory items, as well as their EIN structures, repair histories, and locations. The system keeps chronological histories (a record of the transactions) of installation, relocation, movement, shipment and archiving of inventory items. ILM is used by the Property Management, Maintenance, and Logistics teams to support management of the tangible property of NASA's EOSDIS project.

ILM is a customized application of the Remedy Action Request System (ARS). The customizations adapt the product to the ILS processes used for ECS. ILM takes into account how business rules and logistics concepts are applied on the ECS project. This document does not address these considerations in detail, but the following general introduction should help.

Each inventory item is identified by a unique Equipment Inventory Number (EIN). In the case of hardware items, an EIN corresponds to a silver sticker affixed to the item. Some of the items are shipped to sites and installed. Others such as consumables are issued but not installed. After a period, some items may be transferred to other locations or relocated for use with other parent machines. Items are archived when no longer needed or serviceable. For tracking and auditing purposes, inventory items – especially hardware – are allocated to ECS "parent" machines. These parent and child relationships are called an EIN structure. EIN structures have active and inactive dates that establish the timeframe during which the pairing is in effect.

Table 4.3.4-1 summarizes the operator functions that Remedy supports. The sections that follow present how to use Remedy features that were customized for ECS inventory, logistics, and maintenance management. For more information on Remedy's Action Request System, refer to Remedy help manual.

Table 4.3.4-1. Common ECS Operator Functions Performed with ILM

Operating Function	GUI (Section)	Description	When and Why to Use
Property Management	ILM-EIN – 4.3.4.2.1 ILM-EIN Structure – 4.3.4.2.2 ILM-EINTransactions – 4.3.4.2.3 ILM-Transaction Log – 4.3.4.2.4 ILM-OEM Parts – 4.3.4.2.5 ILM-Vendor-MFR – 4.3.4.2.6 ILM-HwSw Code – 4.3.4.2.7 ILM-Status Codes– 4.3.4.2.8 ILM-Maint Contract – 4.3.4.2.9 ILM-Sites – 4.3.4.2.10 ILM-Inventory Location – 4.3.4.2.11	Maintain information about accountable property items, their product structures, and inter-relationships.	To maintain information that specifies the identity, source, location, transfer, relocation, and installation of procured inventory items.
Property Maintenance	ILM-MWO – 4.3.4.3.1 ILM-MWO Line Item – 4.3.4.3.2	Manage information for required maintenance repairs.	To predefine and monitor scheduled maintenance activities
License Management	ILM-License Products– 4.3.4.4.1 ILM-License Entitlement – 4.3.4.4.2 ILM-License – 4.3.4.4.3 ILM-License Mapping – 4.3.4.4.4 ILM-Additional Host – 4.3.4.4.5	Manage entitlements, licenses, and license allocations for licensed COTS software.	To track the receipt, movement, and consumption of software licenses and their associated rights-to-use.
System Administrator	ILM-System Parameters – 4.3.4.5 User – 4.3.4.6 Remedy Admin Tool – 4.3.4.7 Database – 4.3.4.8 Special Constraints – 4.3.4.9 Outputs – 4.3.4.10 Event and Error Messages – 4.3.4.11 Reports – 4.3.4.12	Manage AR System	To revise, add, or delete Remedy ILM related objects (forms, active links, filters, menus, etc.).

4.3.4.1 Invoking Remedy-ILM from a PC

To start Remedy User, you can do one of the following:

- Click Start →Programs →Action Request System →Remedy User
- Double-click on a Remedy User icon on your desktop, if one exists.

The Remedy User screen displays. Enter your user Id and password.

Once logged into Remedy User, you can open a form. To view a list of all available forms, select **File → Open,** or select the Open icon, the first icon in the toolbar. This displays the complete list of forms to which the operator have access (see Figure 4.3.4.1).

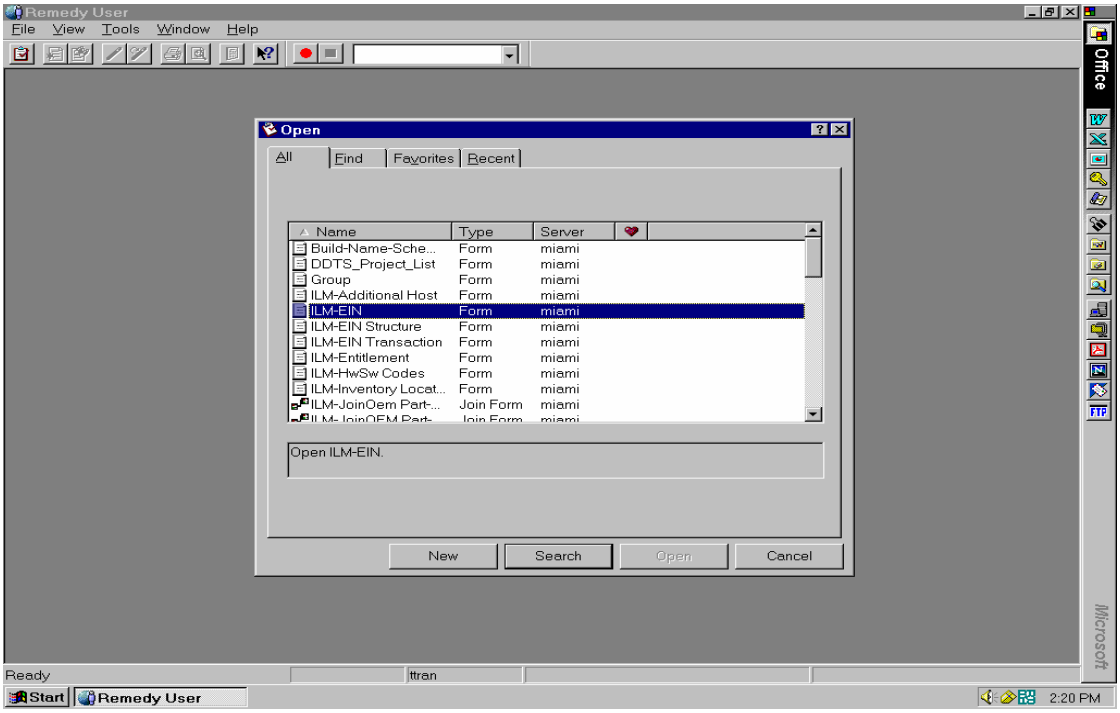


Figure 4.3.4-1. Open GUI

Every form has a specific layout and content. Every form initially opens in one of two modes:

- **New** – to create a new record
- **Search** – to search for an existing record

4.3.4.1.2 ILM-Roles

The following are ILM-related roles Remedy is deployed pre-configured to support:

- ILMadmin - full privileges to all operator and system administrator functions within ILM;
- ILMproperty - all ILM property privileges only;
- ILMmaint - maintenance management data update privileges for central ILS managers;

- ILMdaacAdmin - full privileges to all operator and system administrator functions within ILM for a site's local maintenance coordinator;
- ILMdaacMaint - maintenance management data update privileges for a site's local maintenance coordinator;
- ILMquery - ILM data query privileges only;
- ILMlicuser - license management data update privileges for software license administrators;

The following sections will discuss all of ILM's forms in more detail.

4.3.4.2 Property Management

Remedy provides the M&O staffs at the EDF and the DAACs the capability to maintain inventory records, including EIN structures. Property Administrators can submit new records, modify existing ones, and perform transactions that capture installation, relocation, movement, shipment and archive activities. These transactions are logged for historical purposes. The following forms provide the mechanism to perform the aforementioned tasks:

- ILM-EIN – is designed to create, modify, and view all inventory items and their assemblies.
- ILM-EIN Structure – is designed for viewing the structure of a machine.
- ILM-EIN Transactions – provides Property Administrator the capability to perform the following EIN transactions: Installation, Relocation, Movement, Shipment, and Archive.
- ILM-OEM Parts – records manufacturers' or vendor's part numbers and other parts information.
- ILM-Vendor-MFR – records vendors and manufacturers information
- ILM-HwSw Code- records inventory items type
- ILM-Status – records inventory status
- ILM-Maint Contract – maintains maintenance contracts information
- ILM-Transaction Log – Logs all the transactions performed on inventory items.

The following sections will describes each of these forms in more detail.

4.3.4.2.1 ILM-EIN GUI

The ILM-EIN form (Figures 4.3.4-2 – 4.3.4-6) is used for creating, viewing or modifying all EMD inventory items's records. In addition, this form allows the Property Administrator to create and modify EIN structures via the Parent EIN field. Other ILM groups may view and perform reports on this form.

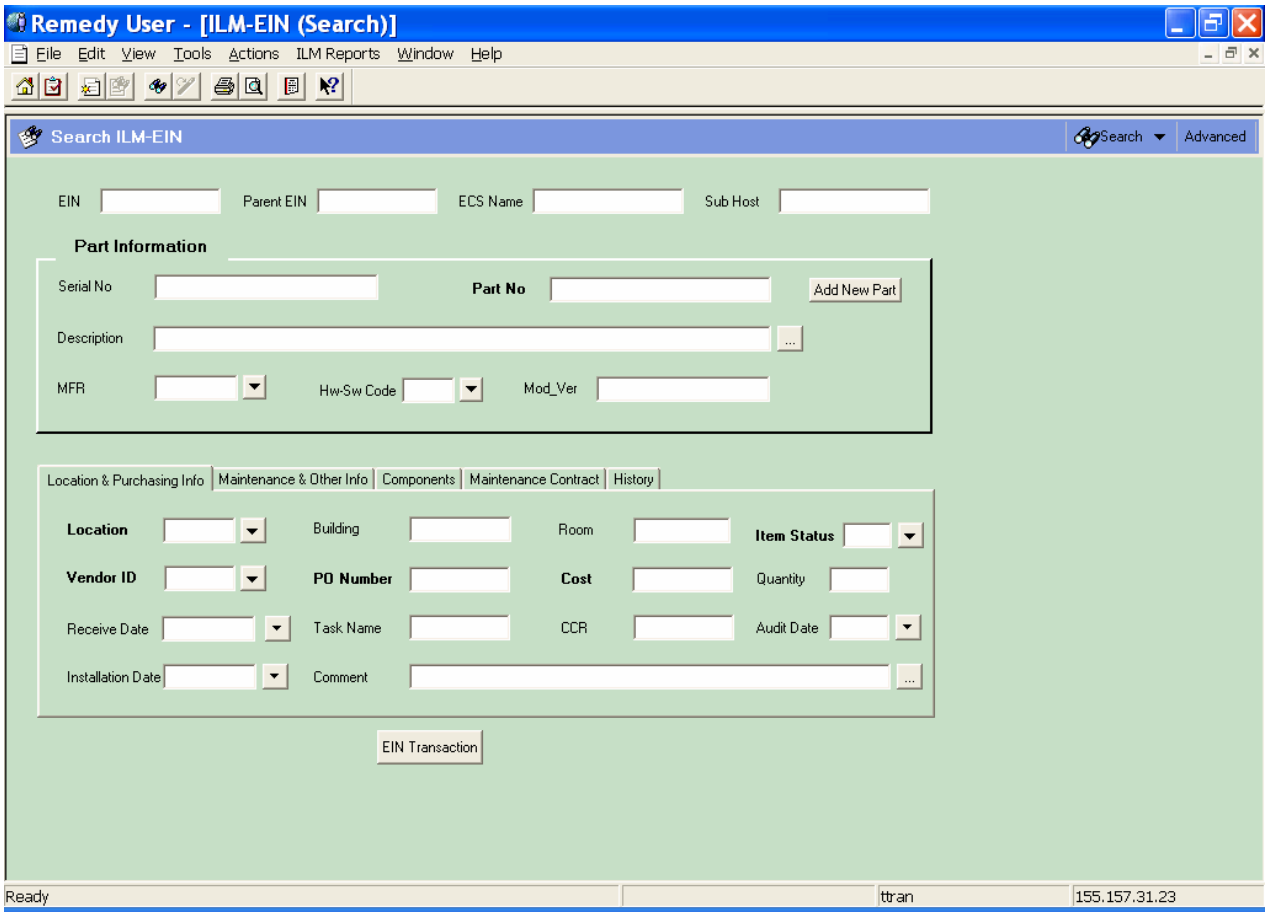


Figure 4.3.4-2. ILM-EIN (Part Info and Location & Purchasing Info) GUI (1 of 5)

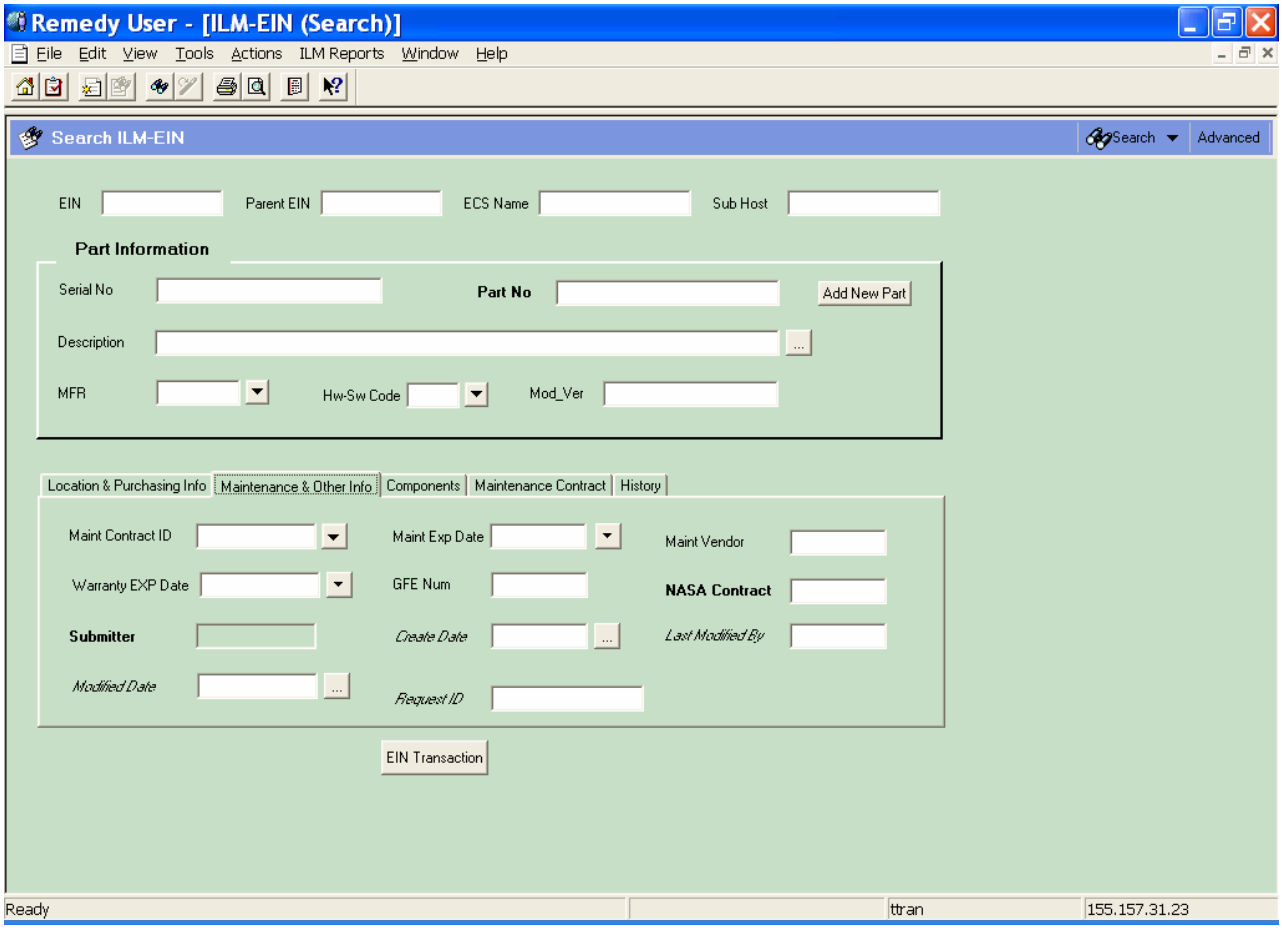


Figure 4.3.4-3. ILM-EIN (Maintenance & Other Info.) GUI (2 of 5)

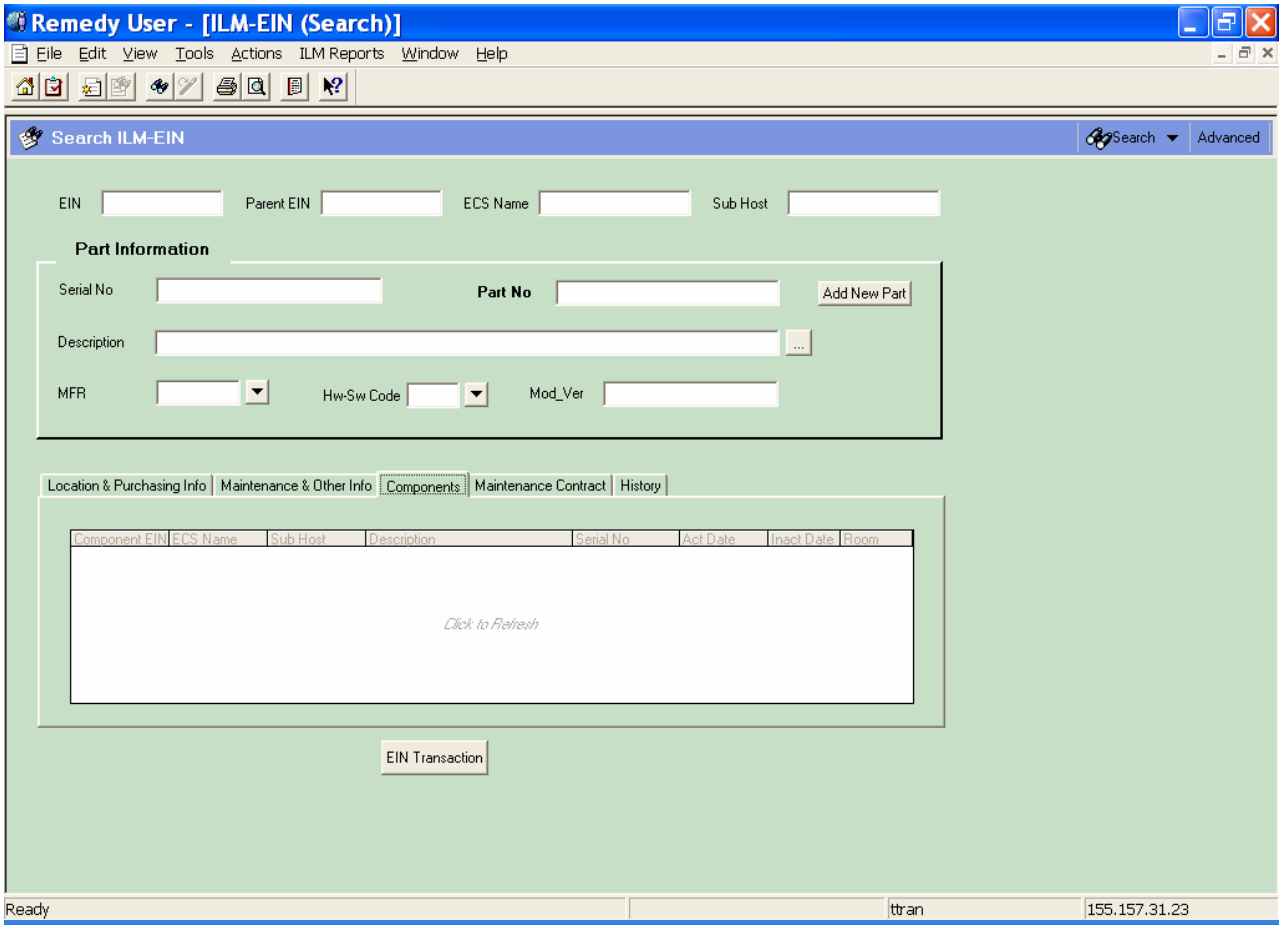


Figure 4.3.4-4. ILM-EIN (Components) GUI (3 of 5)

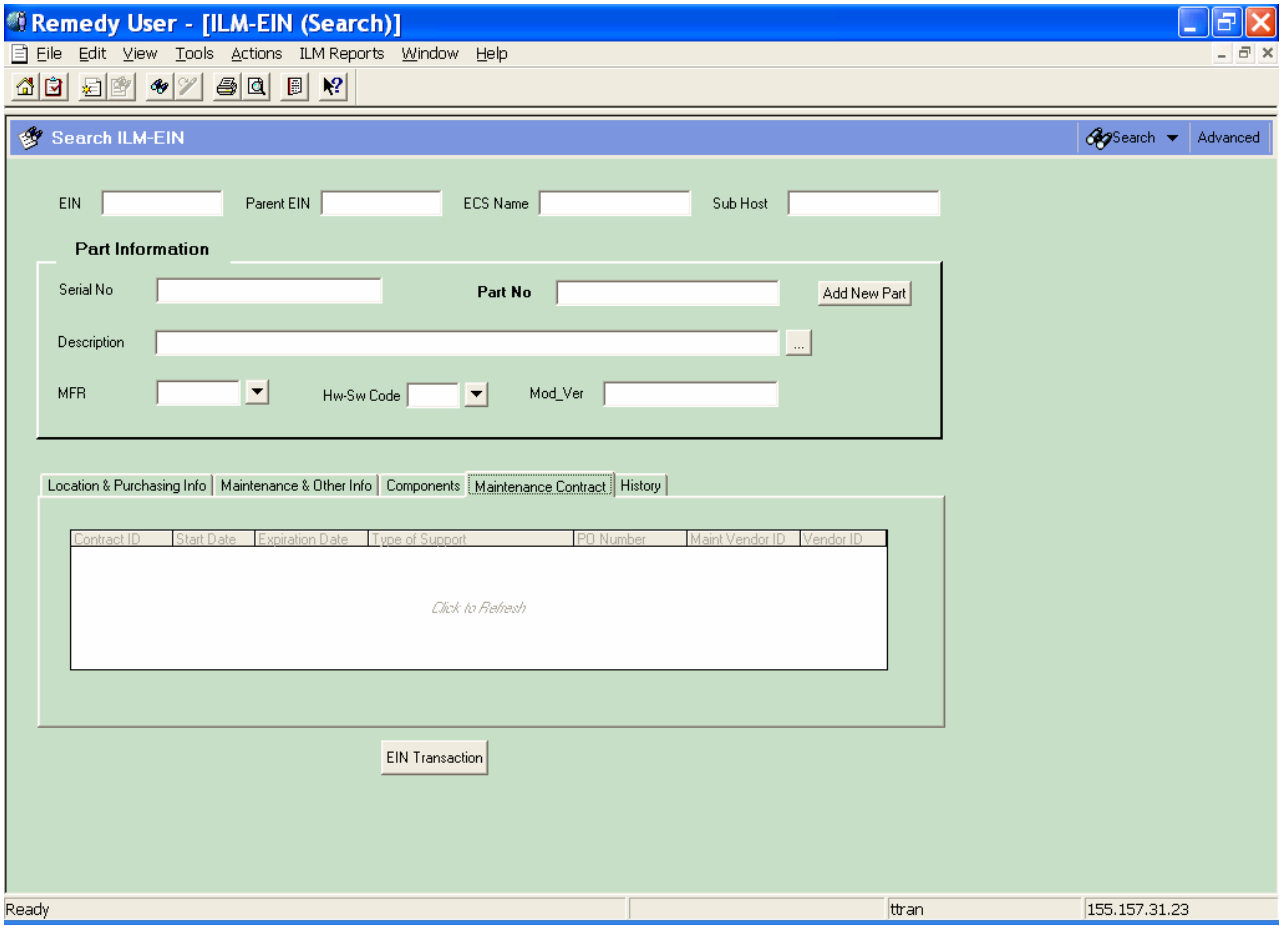


Figure 4.3.4-5. ILM-EIN (Maintenance Contract) GUI (4 of 5)

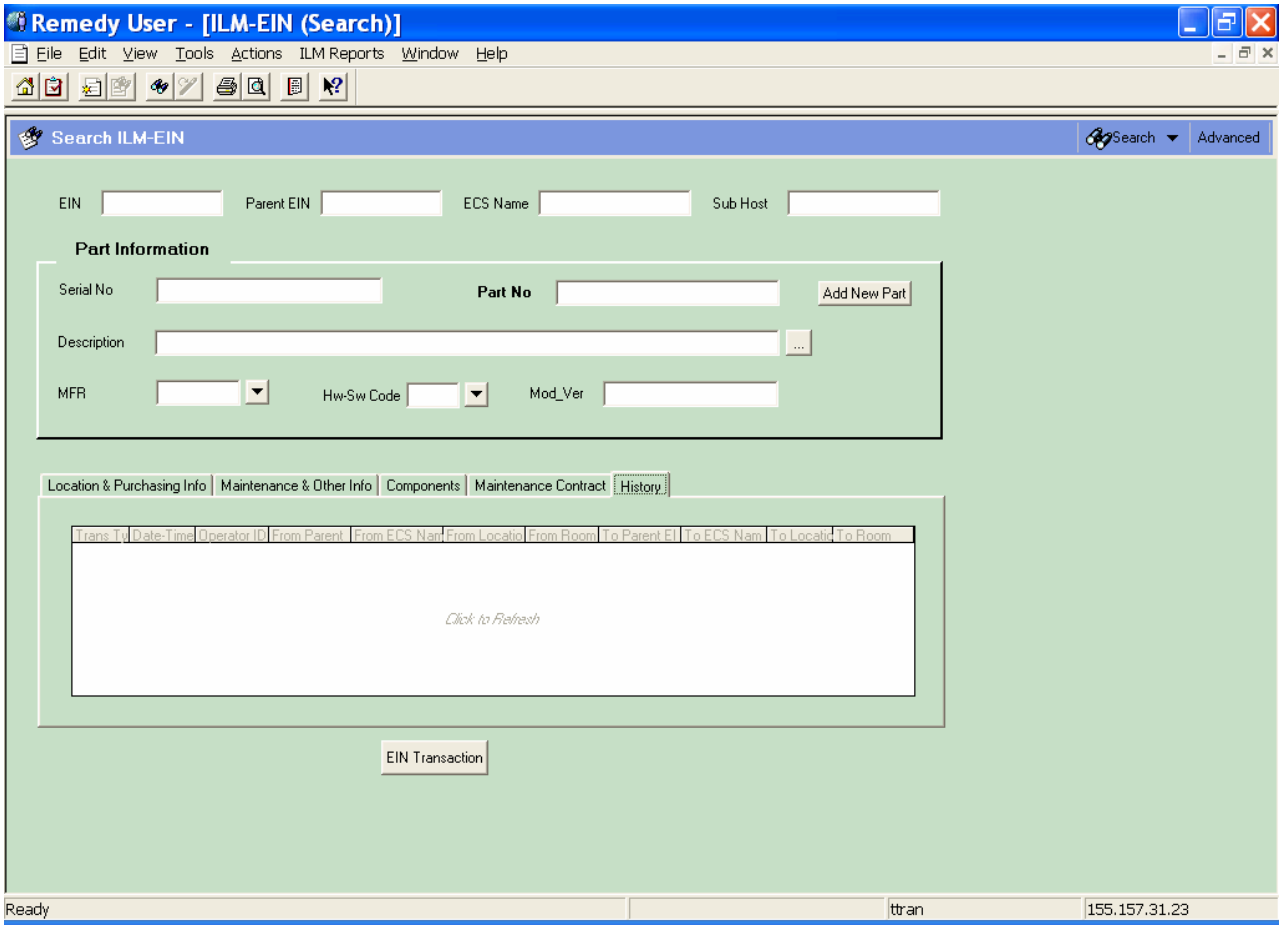


Figure 4.3.4-6. ILM-EIN (History) GUI (5 of 5)

Table 4.3.4-2 describes the fields on the ILM-EIN form.

Table 4.3.4-2. ILM-EIN Form Fields Descriptions (1 of 2)

Field Name	Data Type	Size	Entry	Description
EIN	Char	20	optional	Identifier for an inventory item.
Parent EIN	Char	20	optional	EIN of the host of which this item is a component.
ECS Name	Char	30	optional	Name of the machine with which the item is associated.
Sub Host	Char	30	optional	Sub host is use to identify individual hosts within a main host. For example: Communication Rack, Rack will have 1 name installed. Items in the rack can each have a different name, this name is put into the sub host field.
Serial No	Char	30	optional	Manufacturer's serial number of the item.
Part No	Char	34	optional	Manufacturer's or vendor's part number.
Description	Char	80	optional	Manufacturer's or vendor's description for the item.
MFR	Char	6	optional	Code used for the manufacturer.
Hw-Sw Code	Char	2	optional	Code for classifying inventory items by type.
Mod-Ver	Char	24	optional	Model or version of the item.
Location & Purchasing Info.	n/a	n/a	Page	Contains the following fields about the EIN item: Location, Building, Room, Item Status, Vendor ID, PO Number, Cost, Quantity, Receive Date, Installation date, and Audit Date.
Location	Char	6	optional	Identifier that designates an inventory location.
Building	Char	6	optional	Identifier for the building where the item can be found.
Room	Char	15	optional	Identifier for the room where the item can be found.
Item Status	Char	1	Optional, default R.	Code that designates the status of the item. The following values are set when processing transactions: R = Received; SP = Spare Equipment; I = Installed; X = Archived;
Vendor ID	Char	6	required	Code for the Vendor from whom the item was purchased.
PO Number	Char	10	Required	Identifier of the purchase order against which the item was received.
Cost	Decimal	10.2	optional	Purchase cost of the item.
Quantity	Integer	4	Optional	Number of items purchased on a particular purchase order
Receive Date	Char	n/a	optional	Date item was received from vendor.
Task Name	Char	10	optional	Name of the task order under the EMD contract that the item was originally purchased for.
CCR	Char	10	optional	Approved CCR number that requested the purchasing of the item.
Audit Date	Date	n/a	optional	Date the item was physically inventoried last
Installation Date	Date	n/a	optional	Date the item was installed. The system sets the value during EIN Installation processing.
Comment	Char	120	optional	Miscellaneous information specific to the item.

Table 4.3.4-2. ILM-EIN Form Fields Descriptions (2 of 2)

Field Name	Data Type	Size	Entry	Description
Maintenance & Other Info.	n/a	n/a	Page	Contains the following fields about the EIN item: Maint Contract ID, Maint Exp Date, Maint Vendor, Warranty Exp Date, EMOSD ID, GFE Num, Comment, NASA Contract, Submitter, Create Date, and Last Modified By.
Maint Contract ID	Char	10	optional	Identifier for the Maintenance Contract under which the item is covered.
Maint Exp Date	Date	n/a	optional	Date the maintenance contract will expire. This field reflects the Expiration Date from the Maint Contract ID entered above.
Maint Vendor	Char	6	optional	Code for the vendor the maintenance contract were purchased from.
Warranty EXP Date	Date	n/a	optional	Date that the warranty expires.
GFE NUM	Char	8	optional	Identifier assigned by the Government to an item of government furnished equipment.
NASA Contract	Char	11	Optional, default NAS5-60000	Identifier designating the government contract used for this item. This information is automatically assigned and can not be changed.
Submitter	Char	30	system-supplied	The user whom created the record.
Create Date	Date	n/a	system-supplied	Date the record was created.
Last Modified By	Char	30	system-supplied	The user last modified the record.
Modified Date	Date/Time	n/a	System-supplied	The last date/time the record was modified.
Request ID	Char	15	System-supplied	Provides record identifier.
Components	n/a	n/a	Page	Page for displaying the components of a parent EIN. It displays the Component EIN, ECS Name, Sub Host, Description, Serial No, Active Date, Inactive Date, and Room.
Maintenance Contract	n/a	n/a	Page	Page displays attributes of the maintenance contract, such as the Contract ID, Start Date, Expiration Date, Type of support, PO number, maintenance vendor, and vendor ID.
History	n/a	n/a	Page	Contains a listing of EIN transaction history for the EIN. This table displays the following fields describing the transactions: Trans Type, Date-Time, Operator ID, From Parent EIN, From ECS Name, From Location, From Room, To Parent EIN, To ECS Name, To Location, and To Room.

The following buttons are unique to this form:

- Add New Part – Activates the ILM-OEM Parts form. This allows the operator to add new parts or to search for existing parts.
- EIN Transaction – brings up the ILM-EIN Transaction form.

4.3.4.2.2 ILM-EIN Structure GUI

The ILM-EIN Structure form (Figure 4.3.4-7) is designed to allow an Administrator to repair EIN structure records. Other ILM groups may view EIN Structure via the ILM-EIN form discussed in the previous section. To make changes to EIN Structures, always use the ILM-EIN Transaction form that is discussed in Section 4.3.4.2.3.

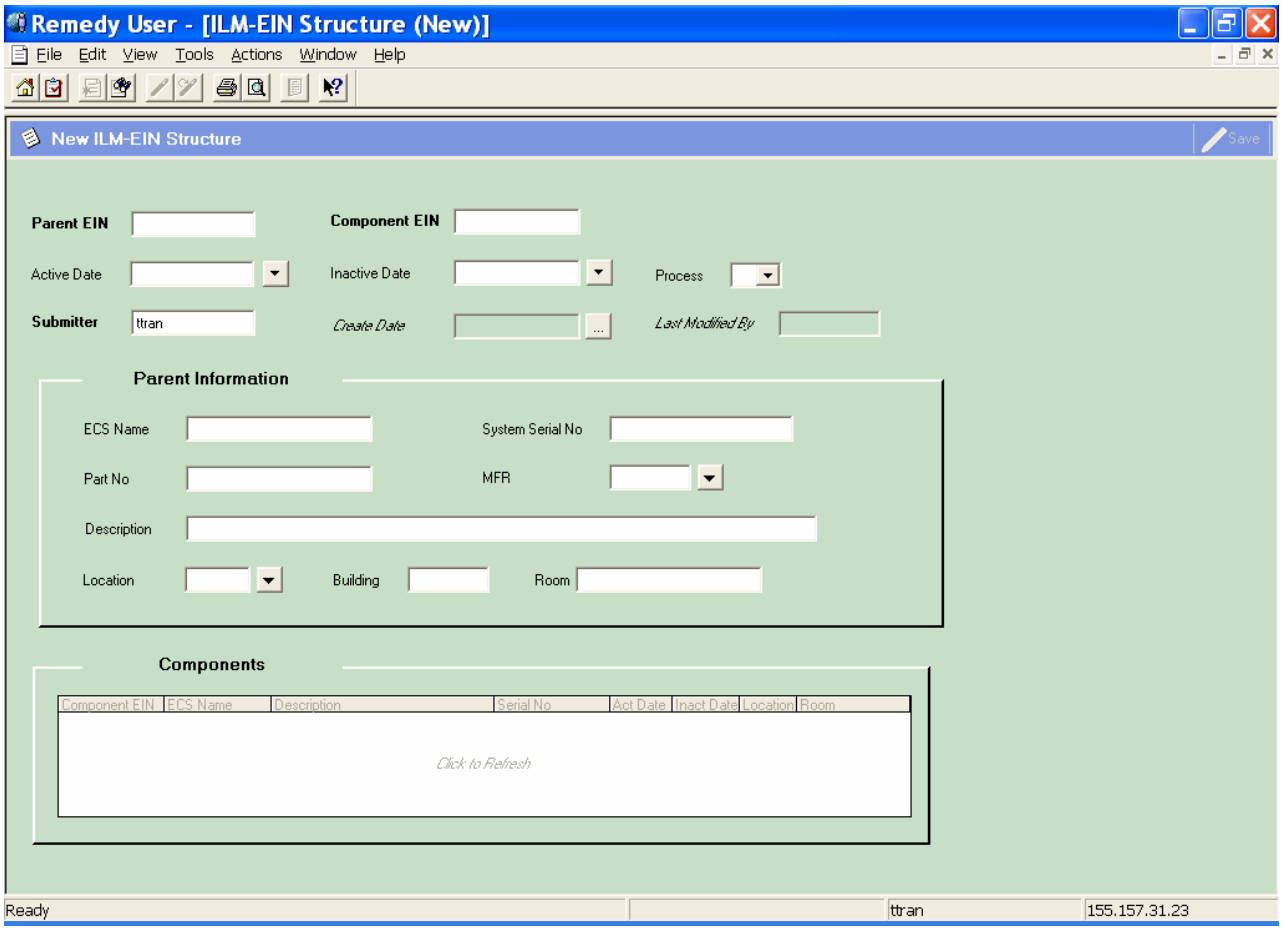


Figure 4.3.4-7. ILM-EIN Structure GUI

Table 4.3.4-3 contains descriptions of the ILM-EIN Structure form's fields.

Table 4.3.4-3. ILM-EIN Structure Form Fields Descriptions

Field Name	Data Type	Size	Entry	Description
Parent EIN	Char	20	Required	EIN for the parent item in an EIN structure.
Component EIN	Char	20	Required	Identifier for an EIN controlled inventory item.
Active Date	Date	n/a	Required	Date the item was added to the parent structure
Inactive Date	Date	n/a	Optional	Date the component is no longer assigned to the Parent EIN.
Process	Char	1	Optional	Identifier for Component EIN to be processed by EIN transactions
Submitter	Char	30	Required	User ID of user who submitted the record.
Create Date	Date/Time	n/a	System-suppliec	Indicates date that the record was created.
Last Modified By	Char	30	System-supplied	Indicates the user who last modified the record.
ECS Name	Char	30	System-supplied	Name of the machine with which the item is associated. This field reflects the ECS Name of the Parent EIN entered above.
System Serial No	Char	30	system-supplied	Serial number of the item. This field reflects the serial no of the Parent EIN entered above.
Part No	Char	34	optional	Manufacturer's or vendor's number for the part.
MFR	Char	6	system-supplied	Code for the manufacturer of the item. This field reflects the MFR of the Parent EIN entered above.
Description	Char	60	system-supplied	Manufacturer's or vendor's description for the item. This field reflects the Description of the Parent EIN entered above.
Location	Char	6	system-supplied	Identifier that designates an inventory location. This field reflects the location of the Parent EIN entered above.
Building	Char	6	system-supplied	The building where the item can be found.
Room	Char	15	system-supplied	The room where the item can be found. This field reflects the room of the Parent EIN entered above.
Components	Table field	n/a	system-supplied	Field for displaying the components of a parent EIN.

4.3.4.2.3 ILM-EIN Transaction GUI

The ILM-EIN Transaction form (Figures 4.3.4-8 to 4.3.4-10) enables the operator to perform the following EIN transactions for inventory items: Installation, Relocation, Return to Stock, Movement, Shipment, and Archive. The operator may select the type of transaction from the drop down list on the Transaction Type field as displayed below. Depending on the type of transaction the operator selects, Remedy will perform inventory updates accordingly. In addition, this form has three tabs: Install/Move/Ship/RTS, Relocate, and Archive. Each tab

contains different information. For instance, Install/Move/Ship/RTS tab contains fields that are applicable to EIN Installation, EIN Movement, EIN Shipment, and Return To Stock. Relocate tab displays fields for EIN Relocation. Archive tab displays field for EIN Archive. The operator can specify components to be processed by pressing the "Select Components to Process" button. Remedy then transfers the operator to the ILM-Process Component form to complete the transaction. Figures 4.3.4.8 to 4.3.4-10 display fields for each tab and Table 4.3.4-4 provides the fields definitions for this form.

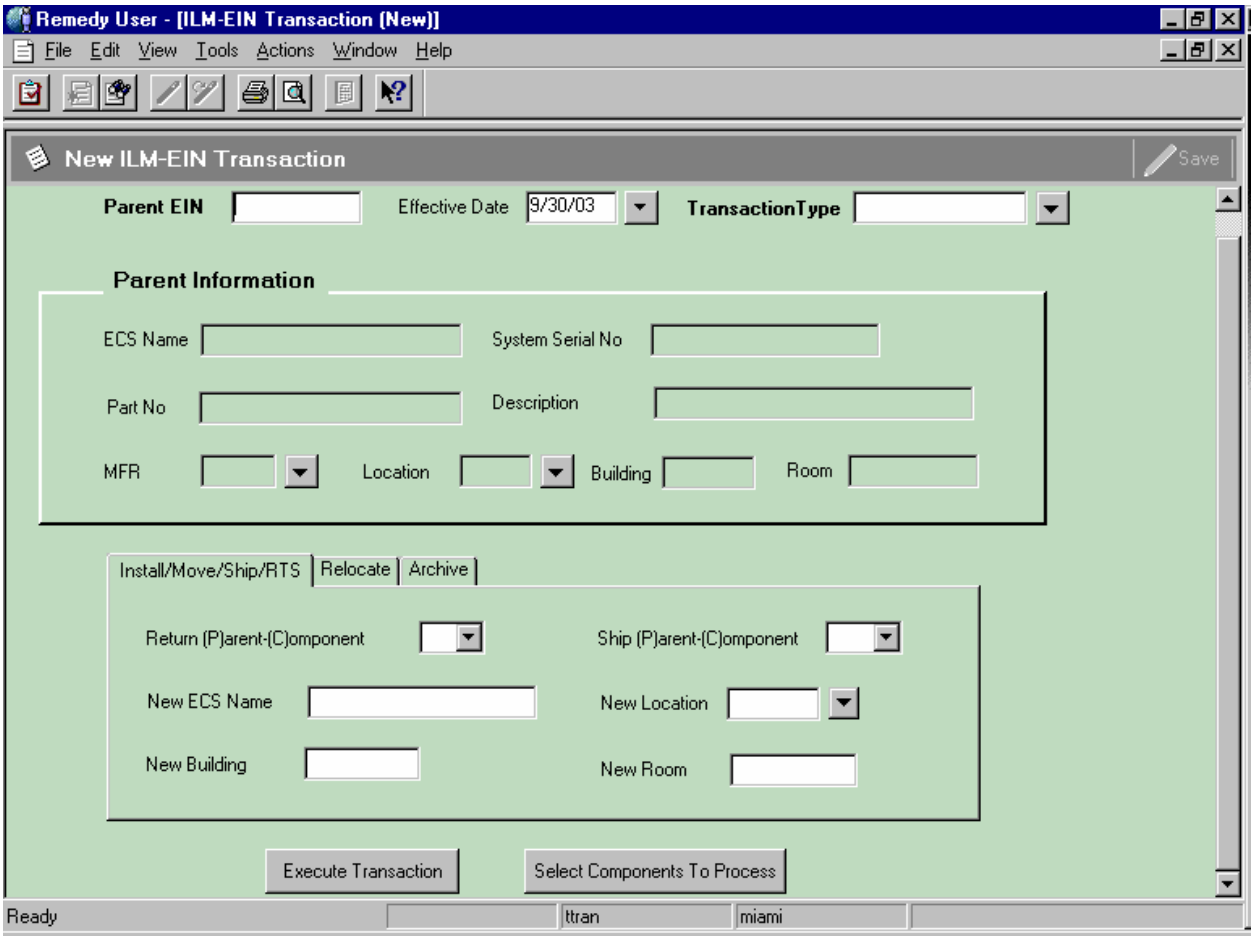


Figure 4.3.4-8. ILM-EIN Transaction (Install/Move/Ship/RTS) GUI (1 of 3)

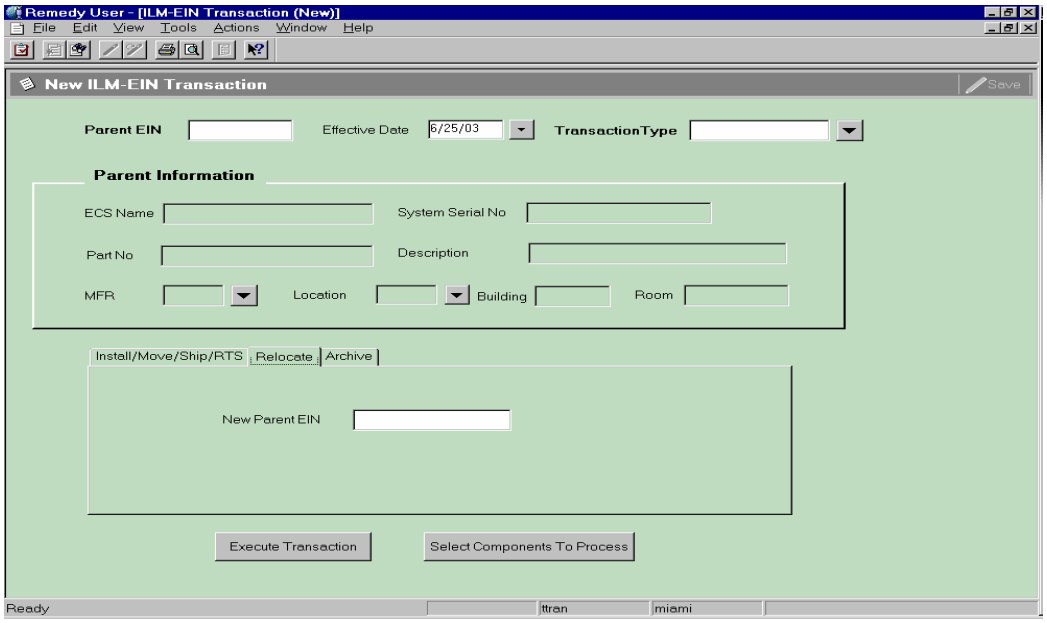


Figure 4.3.4-9. ILM-EIN Transaction (Relocation) GUI (2 of 3)

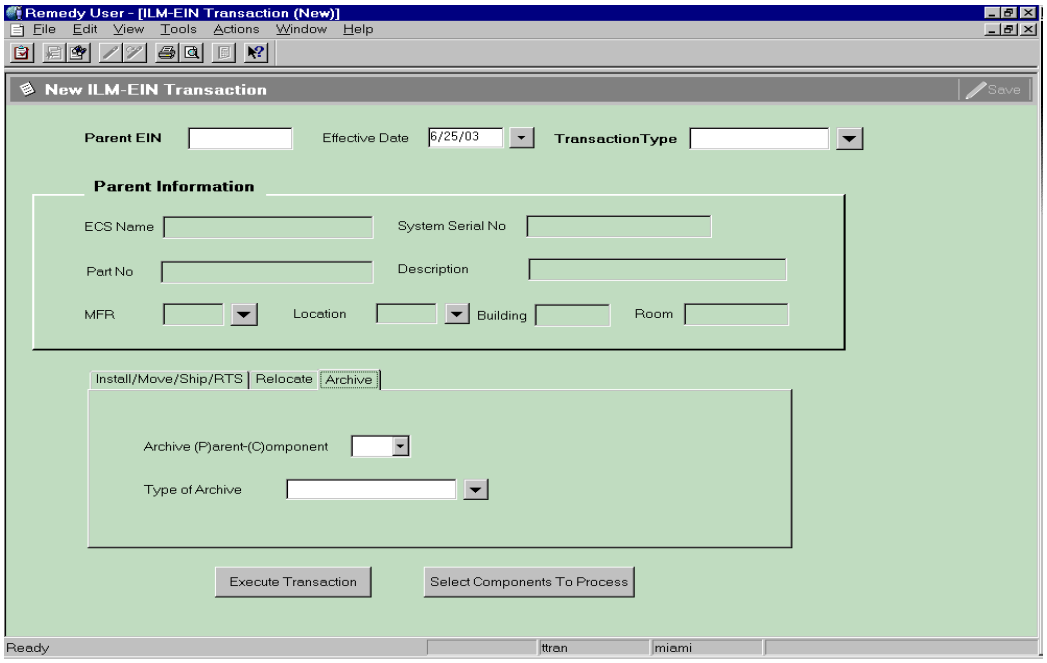


Figure 4.3.4-10. ILM-EIN Transaction (Archive) GUI (3 of 3)

Table 4.3.4-4 provides the fields definitions for the ILM-EIN Transaction form.

Table 4.3.4-4. ILM-EIN Transaction Form Fields Descriptions (1 of 2)

Field Name	Data Type	Size	Entry	Description
Parent EIN	Char	20	required	EIN for the parent item in an EIN structure.
Effective Date	Date		Optional	The date the transaction is in effect.
Transaction Type	Char	15	Required	Type of transaction performs on the Parent EIN such as Installation, relocation, movement, shipment, and archive.
ECS Name	Char	30	System-supplied	Name of the machine with which the item is associated. This field reflects the ECS Name of the Parent EIN entered above.
System Serial No	Char	30	system-supplied	Serial number of the item. This field reflects the serial no of the Parent EIN entered above.
Part No	Char	34	system-supplied	Manufacturer's or vendor's part number. This field reflects the Part No of the Parent EIN entered above.
Description	Char	60	system-supplied	Manufacturer's or vendor's description for the item. This field reflects the Description of the Parent EIN entered above.
MFR	Char	6	system-supplied	Code for the manufacturer of the item. This field reflects the MFR of the Parent EIN entered above.
Location	Char	6	system-supplied	Identifier that designates an inventory location. This field reflects the location of the Parent EIN entered above.
Building	Char	6	system-supplied	The building where the item can be found.
Room	Char	15	system-supplied	The room where the item can be found. This field reflects the room of the Parent EIN entered above.
Install/Move/Ship/ RTS	Page	n/a	n/a	This page contains the following fields to perform the EIN Installation, Movement, Shipment, and Return to Stock: Return (P)arent-(C)omponent, Ship (P)arent-(C)omponent, New ECS Name, New Location, New Building, and New Room.
Return (P)arent-(C)omponent	Char	1	Optional, P or C	Identify whether the operator will return Parent and all of the components or return subset of components.
Ship (P)arent-(C)omponent	Char	1	Optional, P or C	Identify whether the operator will ship Parent and all of the components or ship subset of components.
New ECS Name	Char	30	Optional	New ECS Name for the Parent EIN.
New Location	Char	6	Optional	New Location where the item will be at.
New Building	Char	6	Optional	New Building where the item will be.
New Room	Char	15	Optional	New room where the item will be located.

Table 4.3.4-4. ILM-EIN Transaction Form Fields Descriptions (2 of 2)

Field Name	Data Type	Size	Entry	Description
Relocate	Page	n/a	n/a	This page contains the New Parent EIN field for user to perform EIN relocation.
New Parent EIN	Char	20	Optional	New Parent EIN to which the item(s) will be associated with.
Archive	Page	n/a	n/a	This page contains the following fields to perform EIN archive: Archive (P)arent-(C)omponent and Type of Archive.
Archive (P)arent-(C)omponent	Char	1	Optional, P or C	Identify whether the operator will archive the Parent as well as all the active components or archive a subset of components.
Type of Archive	Char	6	Optional, X,TV,G, RG	Define the type of archive the item(s). Return to Vendor – X,Trade in to vendor - TV Transferred to government - G Government Relieved Accountability - RG

- Pressing the Execute Transaction button will cause the processing of the transaction and the updating of the inventory items in accordance with the type of transaction the operator selected.
- Pressing the "Select Components To Process" button will bring up the ILM-Process Component form. This button is visible only when the transaction is associated with components.

4.3.4.2.3.1 ILM-Join-Process Component GUI

The ILM-Join-Process Component form (Figure 4.3.4-11) displays all the active components for the Parent EIN entered in the ILM-EIN Transaction form and lets the operator specify component to undergo an EIN transaction. This form can be accessed through the "Select Components To Process" button on the bottom of the ILM-EIN Transaction form. However, this button is only visible when the transaction is being performed on components only. For example, the "Select Components To Process" button becomes visible when the user selects to return components (Return (P)arent-(C)omponent) to stock, or relocate components to a new EIN Structure, or archive selected components.

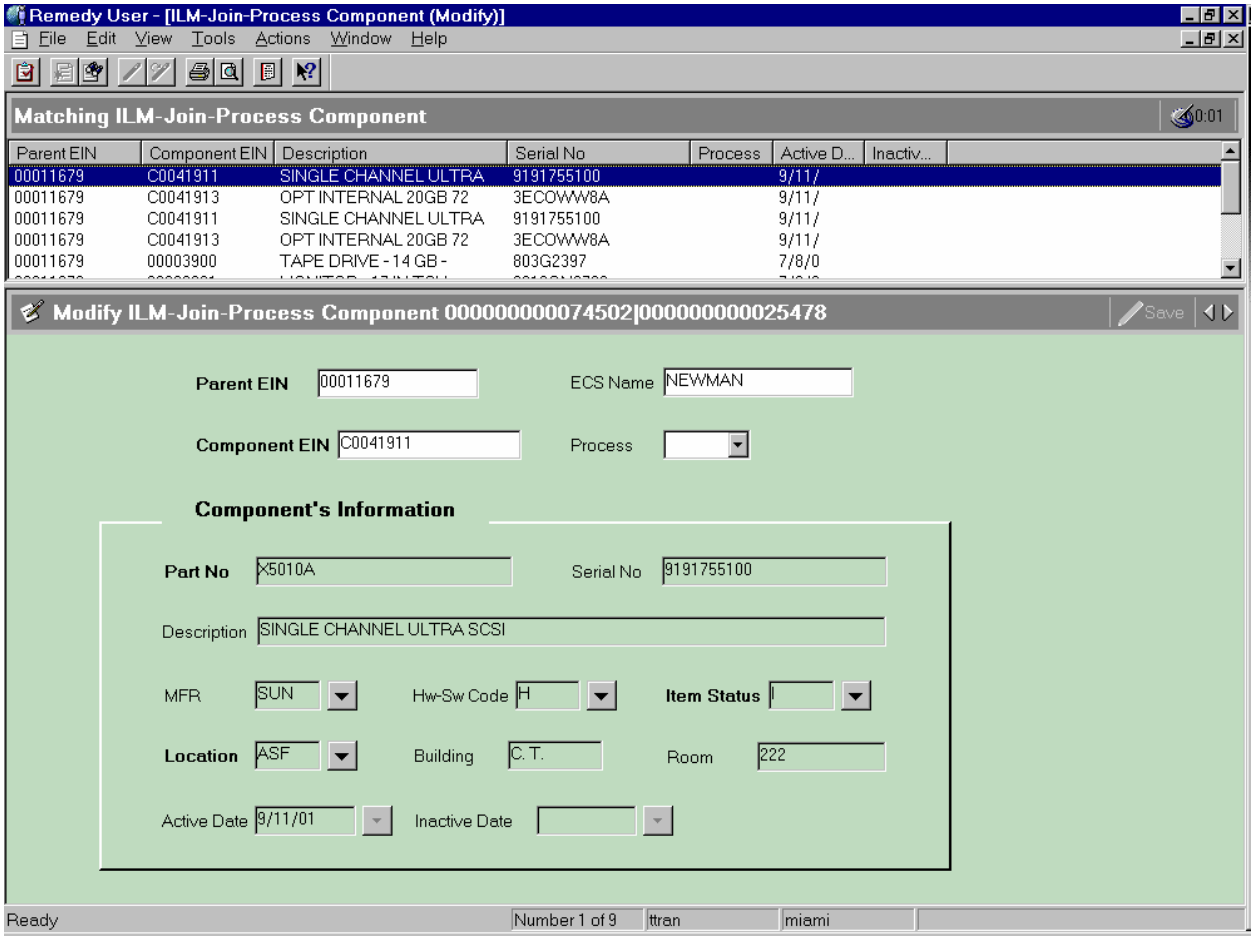


Figure 4.3.4-11. ILM-Join-Process Component GUI

Table 4.3.4-5 provides fields definitions for the ILM-Join-Process Component Form.

Table 4.3.4-5. ILM-Join-Process Component Form Fields Descriptions (1 of 2)

Field Name	Data Type	Size	Entry	Description
Parent EIN	Char	20	System-supplied	EIN for the parent item in an EIN structure.
ECS Name	Char	30	system-supplied	Name of the machine with which the item is associated.
Component EIN	Char	20	system-supplied	EIN for the Component item in an EIN structure.
Process	Char	1	Optional	Indicates whether or not a component is to be processed. Y = Yes, N = No.
Part No	Char	34	system-supplied	Manufacturer's or vendor's part number.

Table 4.3.4-5. ILM-Join-Process Component Form Fields Descriptions (2 of 2)

Field Name	Data Type	Size	Entry	Description
Serial No	Char	30	system-supplied	Serial number of the item.
Description	Char	60	system-supplied	Manufacturer's or vendor's description for the item.
MFR	Char	6	system-supplied	Code for the manufacturer of the item.
Hw-Sw Code	Char	2	system-supplied	Code for classifying items according to source of inventory. This code is provided automatically. Do not change it, manually.
Item Status	Char	1	system-supplied	Code that designates the status of the item.
Location	Char	6	system-supplied	Identifier that designates an inventory location.
Building	Char	6	system-supplied	The build where the item can be found.
Room	Char	15	system-supplied	The room where the item can be found.
Active Date	Date	n/a	system-supplied	Date the item was added to the parent structure
Inactive Date	Date	n/a	system-supplied	Date the component is no longer assigned to the EIN Structure.

4.3.4.2.3 ILM-Transaction Log

ILM-Transaction Log form (Figure 4.3.4-12) is designed for viewing/browsing all the EIN transactions performed on property records. Remedy logs the type of transaction, date/time, operator initiating the transaction, ECS name, Parent EIN, and location changes. This form also shows property record changes due to maintenance actions performed on inventory items (refer to Section 4.3.4.3 for description of maintenance actions.).

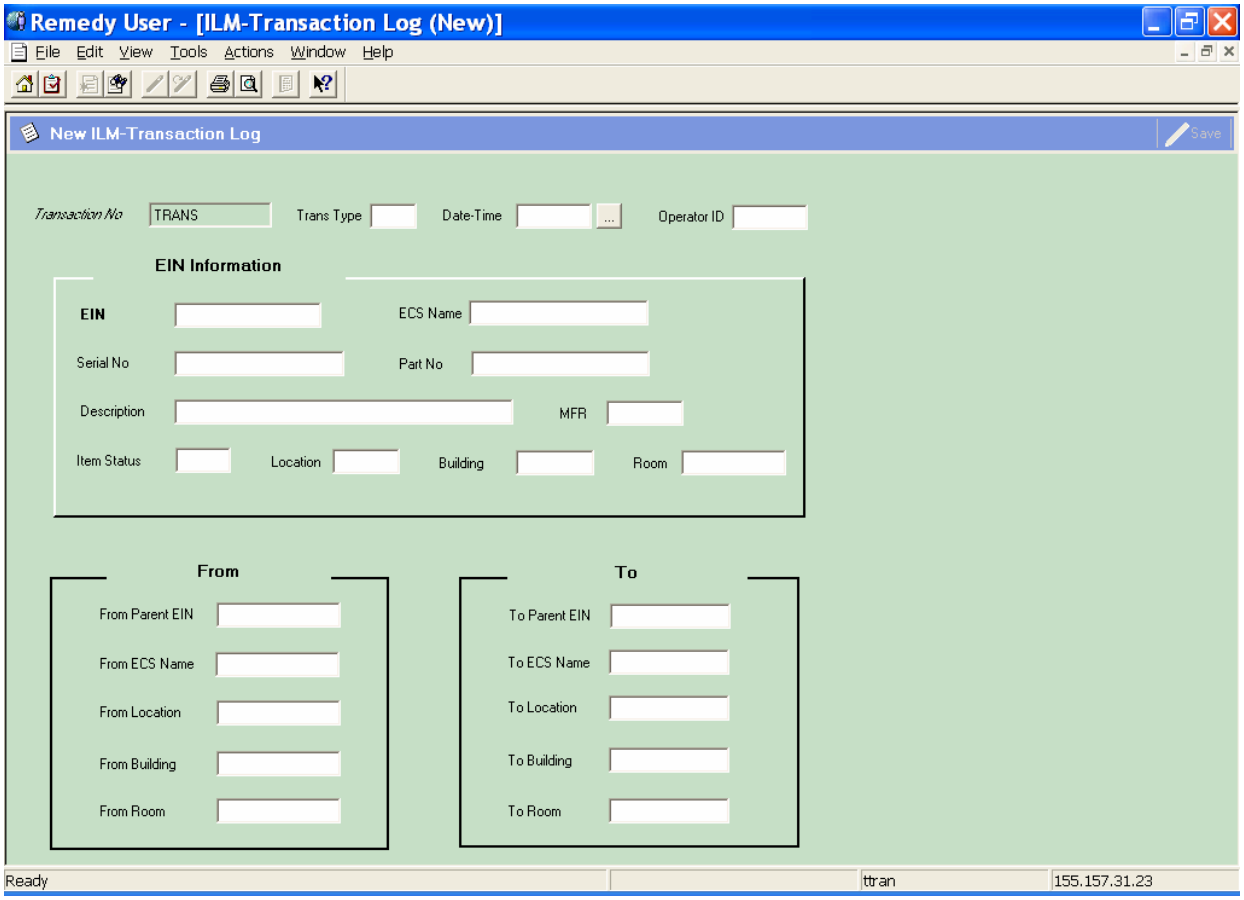


Figure 4.3.4-12. ILM-Transaction Log GUI

Table 4.3.4-6 describes the fields on the ILM-Transaction Log form.

Table 4.3.4-6. ILM-Transaction Log Form Fields Descriptions (1 of 2)

Field Name	Data Type	Size	Entry	Description
Transaction No	Numeric	10	system-supplied	A system generated number that uniquely identify the transaction.
Trans Type	Char	5	system-supplied	The type of transaction operators perform on an inventory item, including: INS - Install, MVE – Move, REL - Relocate, ARC – Archive, MFS – Failed and Returned to Stock, MFV – Failed and returned to the vendor, MNS – New and came from stock, MNV – New and came from vendor, MRR – Relocate to a new Parent via the MWO, and MRS – Relocate to stock via the MWO.
Date-Time	Date	n/a	system-supplied	Date and time the transaction occurred.
Operator ID	Char	10	system-supplied	The operator id who performed the transaction.
EIN	Char	20	system-supplied	The EIN number that the transaction performed on.
ECS Name	Char	30	system-supplied	Name of the machine with which the item is associated.
Serial No	Char	30	system-supplied	Serial number of the item
Part No	Char	30	system-supplied	Manufacture's or vendor's part number.
Description	Char	60	system-supplied	Manufacturer's or vendor's description of the item.
MFR	Char	6	system-supplied	Code for the manufacturer of the item
Item Status	Char	1	Optional, default R.	Code that designates the status of the item. The following values are set when processing transactions: R = Received; SP = Spare Equipment; I = Installed; X = Archived;
Location	Char	6	system-supplied	Identifier that designates an inventory location. This field reflects the location of the Parent EIN entered above.
Building	Char	6	system-supplied	The building where the item can be found.
Room	Char	15	system-supplied	The room where the item can be found. This field reflects the room of the Parent EIN entered above.
From Parent EIN	Char	20	system-supplied	The parent EIN where the EIN originated from.
To Parent EIN	Char	20	system-supplied	The new parent EIN where the EIN is locating.

Table 4.3.4-6. ILM-Transactions Log Form Fields Descriptions (2 of 2)

Field Name	Data Type	Size	Entry	Description
From ECS Name	Char	30	system-supplied	Name of the machine with which the item is associated
To ECS Name	Char	30	system-supplied	Name of the machine with which the item is associated
From Location	Char	6	system-supplied	The original location where the EIN was.
To Location	Char	6	system-supplied	The new location where the EIN can be found.
From Building	Char	6	system-supplied	The original building where the EIN was located.
To Building	Char	6	system-supplied	The new building where the EIN is located.
From Room	Char	15	system-supplied	The Original room where the EIN located.
To Room	Char	15	system-supplied	The new room where the EIN can be found.

4.3.4.2.6 ILM-OEM Parts GUI

Operators use the ILM-OEM Parts form (Figure 4.3.4-13) to maintain standardized information about manufacturer's parts. Parts information must be recorded in the ILM-OEM Parts form before they can be added to an inventory item's record.

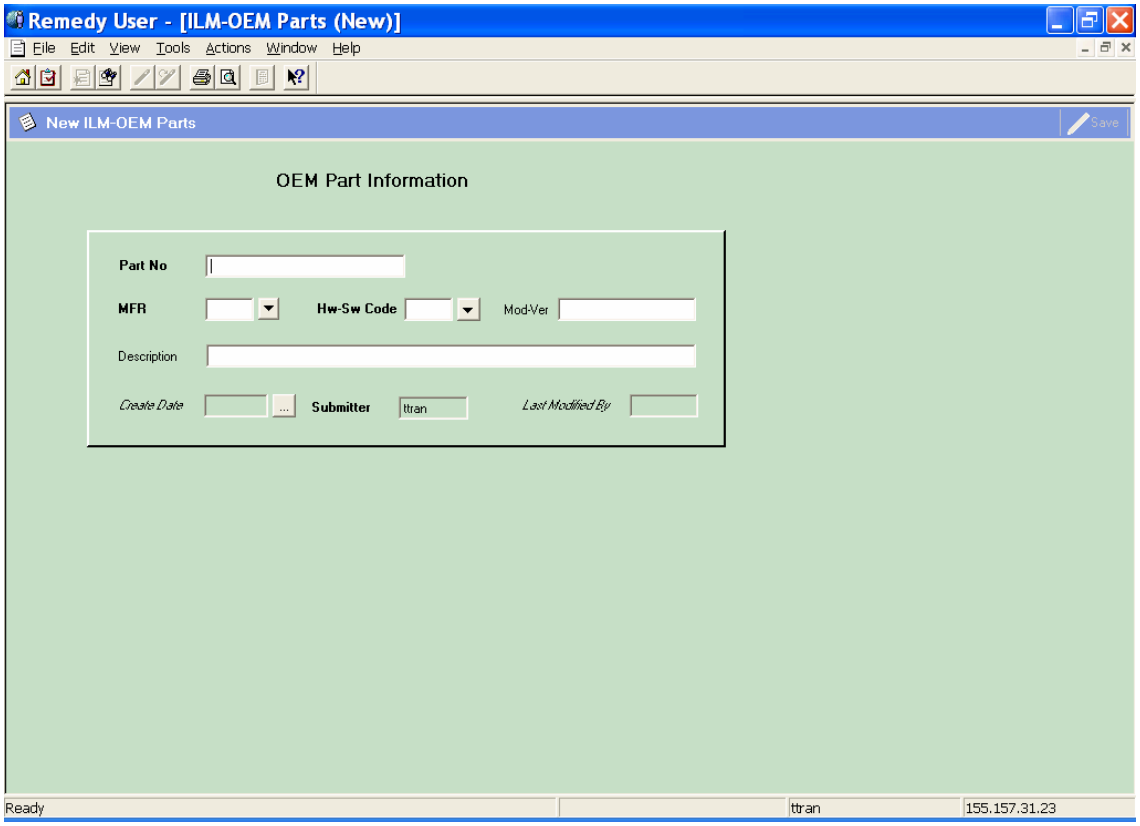


Figure 4.3.4-13. ILM-OEM Parts GUI

Table 4.3.4-7 provides the definitions for fields on the ILM-OEM Parts form.

Table 4.3.4-7. ILM-OEM Parts Form Fields Descriptions

Field Name	Data Type	Size	Entry	Description
Part No	Char	34	required	Manufacturer's or vendor's part number for an item.
MFR	Char	6	required	Code for the manufacturer of the item.
Hw-Sw Code	Char	2	optional	Code for classifying items according to source of maintenance costs.
Mod-Ver	Char	24	optional	Model or version of the item.
Description	Char	60	required	Manufacturer's or vendor's description of the item.
Create Date	Date	n/a	system-supplied	Date the record was created.
Submitter	Char	30	system-supplied	The user who created the record.
Last Modified By	Char	30	system-supplied	User ID of the last person that modified the record.

4.3.4.2.7 ILM-Vendor-MFR GUI

The ILM-Vendor-MFR form (Figure 4.3.4-14) enables operators to define valid vendor codes for use with EIN records. The operator enters the data or modifies the data in the fields for this form as required.

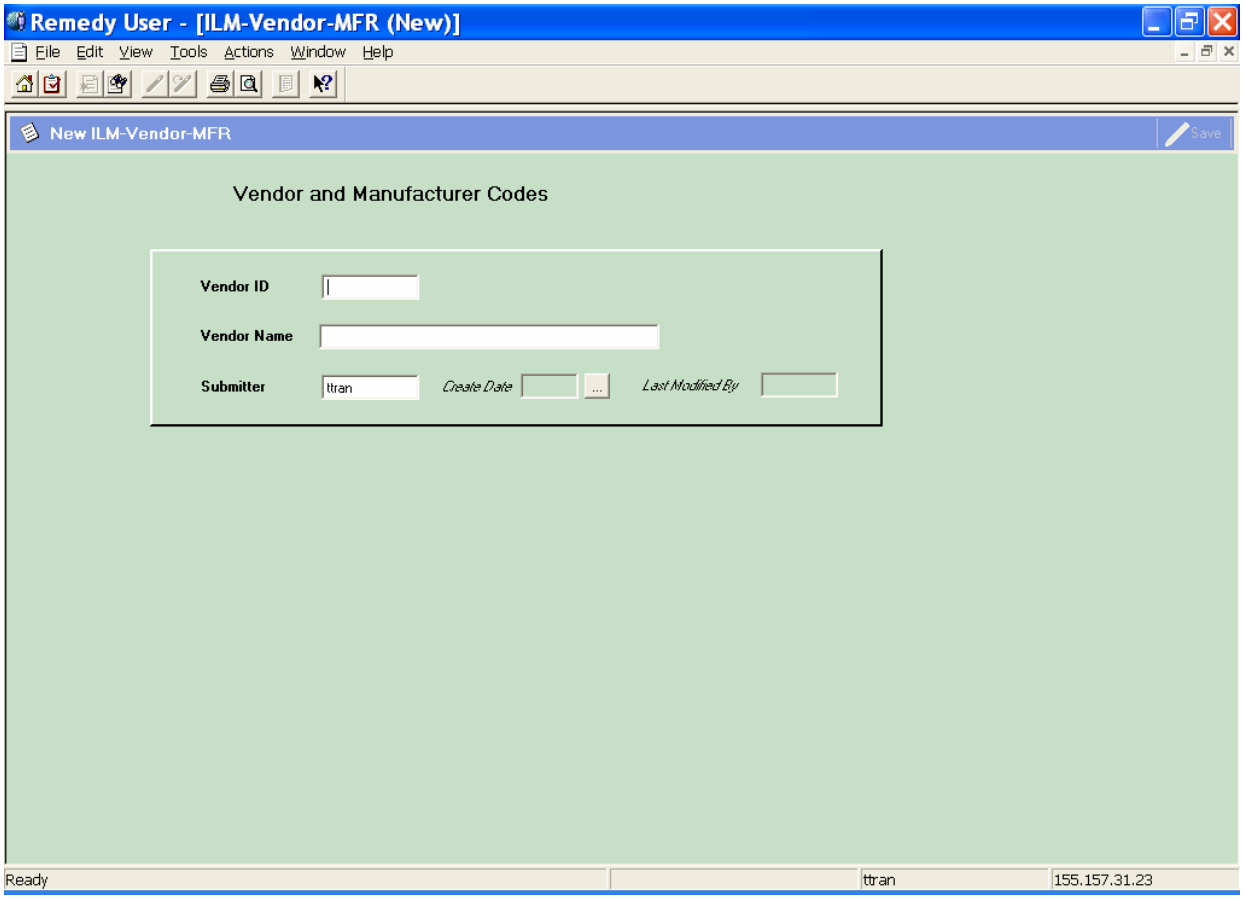


Figure 4.3.4-14. ILM-Vendor-MFR GUI

Table 4.3.4-8 describes the fields on the ILM-Vendor-MFR form.

Table 4.3.4-8. ILM-Vendor-MFR Form Fields Descriptions

Field Name	Data Type	Size	Entry	Description
Vendor ID	Char	6	required	Code for a vendor from whom items are purchased.
Vendor Name	Char	30	optional	Full name of a vendor from who items are purchased.
Submitter	Char	30	system-supplied	The user whom created the record.
Create Date	Date	n/a	system-supplied	Date the record was created.
Last Modified By	Char	30	system-supplied	The user that last modified the record.

4.3.4.2.8 ILM-HwSw Codes GUI

Operators use this form (Figure 4.3.4-15) to maintain a standard set of codes for distinguishing items according to source of maintenance costs. These codes are associated with EIN items and are essential for grouping inventory items for reporting and browsing.

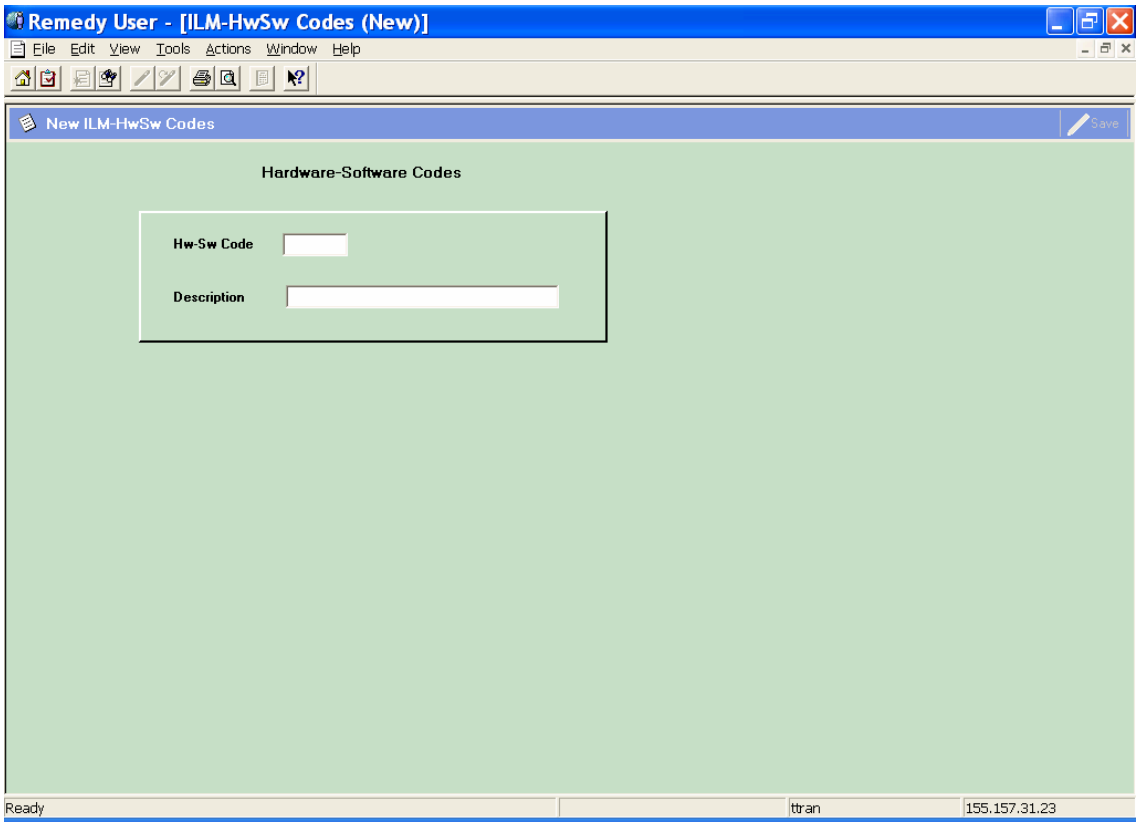


Figure 4.3.4-15. ILM-HwSw Codes GUI

Table 4.3.4-9 describes the fields on the ILM-HwSw Codes form.

Table 4.3.4-9. ILM-HwSw Codes Form Fields Descriptions

Field Name	Data Type	Size	Entry	Description
Hw/Sw Code	Char	2	required	Code for classifying items according to source of maintenance costs.
Description	Char	30	required	Description for the Hardware/Software code.

4.3.4.2.9 ILM-Status Codes GUI

The ILM-Status Codes form (Figure 4.3.4-16) maintains a set of standardized codes for identifying valid inventory item states in the inventory and logistics life cycle.

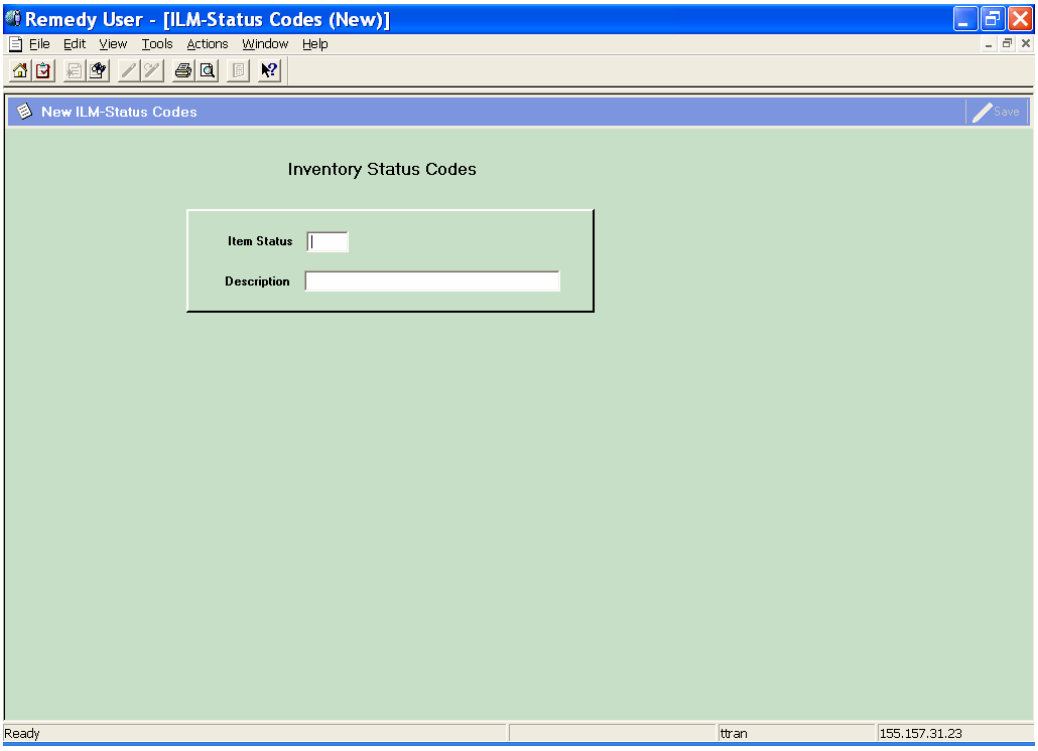


Figure 4.3.4-16. ILM-Status Codes GUI

Table 4.3.4-10 describes the fields on the ILM-Status Codes form.

Table 4.3.4-10. ILM-Status Codes Form Fields Descriptions

Field Name	Data Type	Size	Entry	Description
Item Status	Char	6	required	Code for an inventory status for an item.
Description	Char	30	required	Description for the code.

4.3.4.2.10 ILM-Maint Contract GUI

The ILM-Maint Contract form (Figure 4.3.4-17) provides the ability to track information about maintenance contracts with vendors and suppliers. The contract ID is the key field and should be the actual number that the purchasing agent or the vendor assigns. The data entered here supports data entry for the ILM-EIN form (Section 4.3.4.2.2). This form contains two tabs: Purchasing Information and EINs Covered. Purchasing Information contains fields pertaining to the maintenance purchase order. The EINs Covered tab displays a list of EINs the maintenance contract covers. (See Figures 4.3.4-18 and 4.3.4-19).

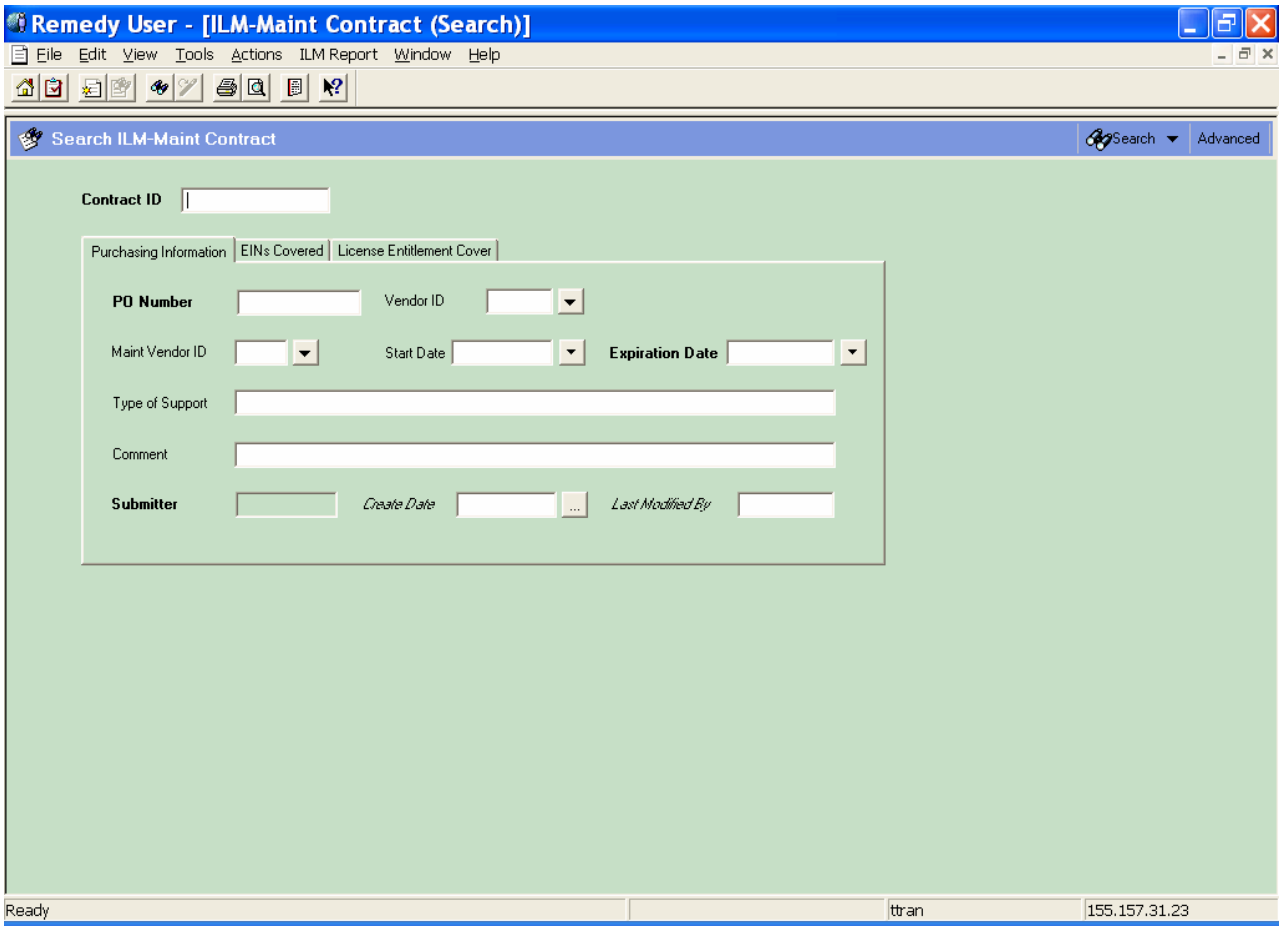


Figure 4.3.4-17. ILM-Maint Contract GUI (1 of 3)

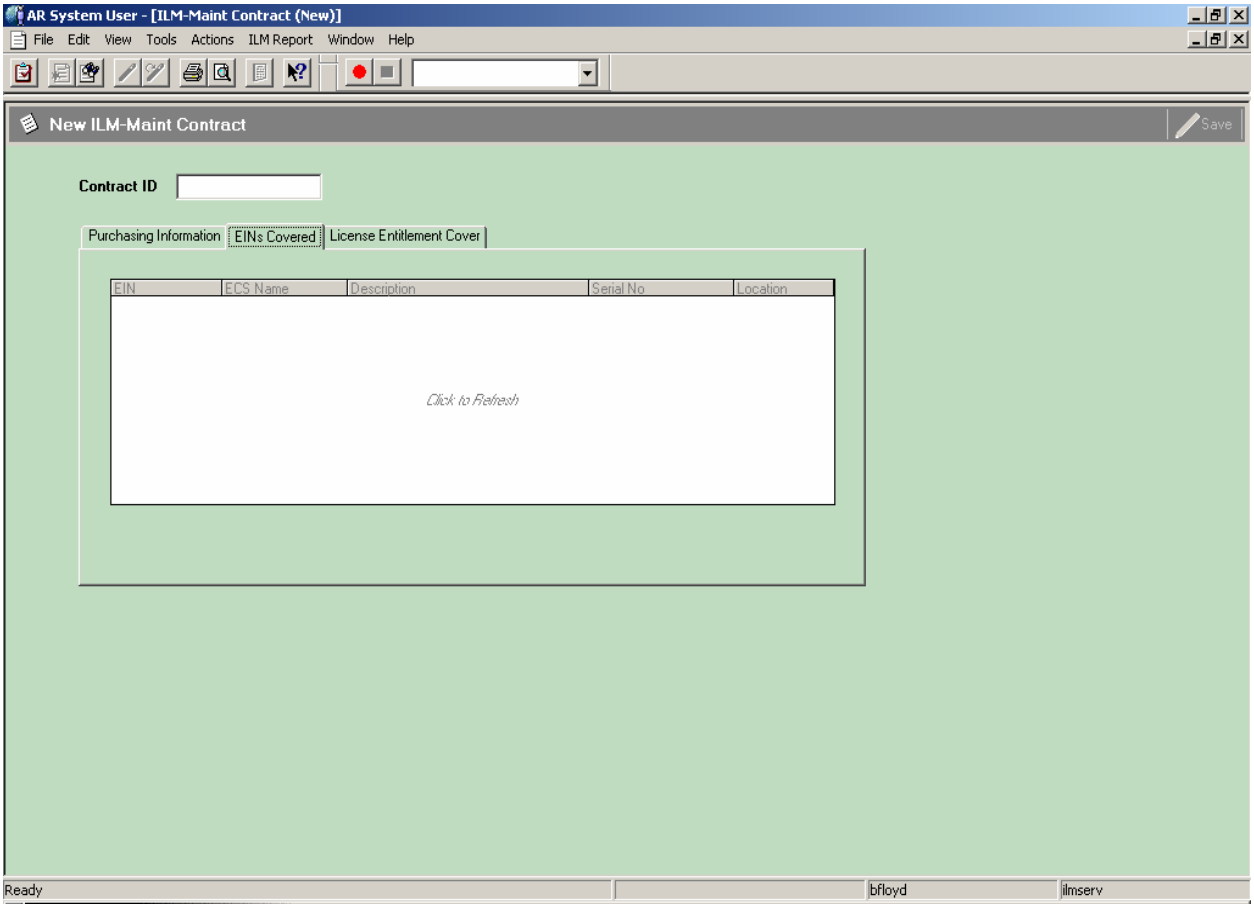


Figure 4.3.4-18. ILM-Maint Contract GUI (2 of 3)

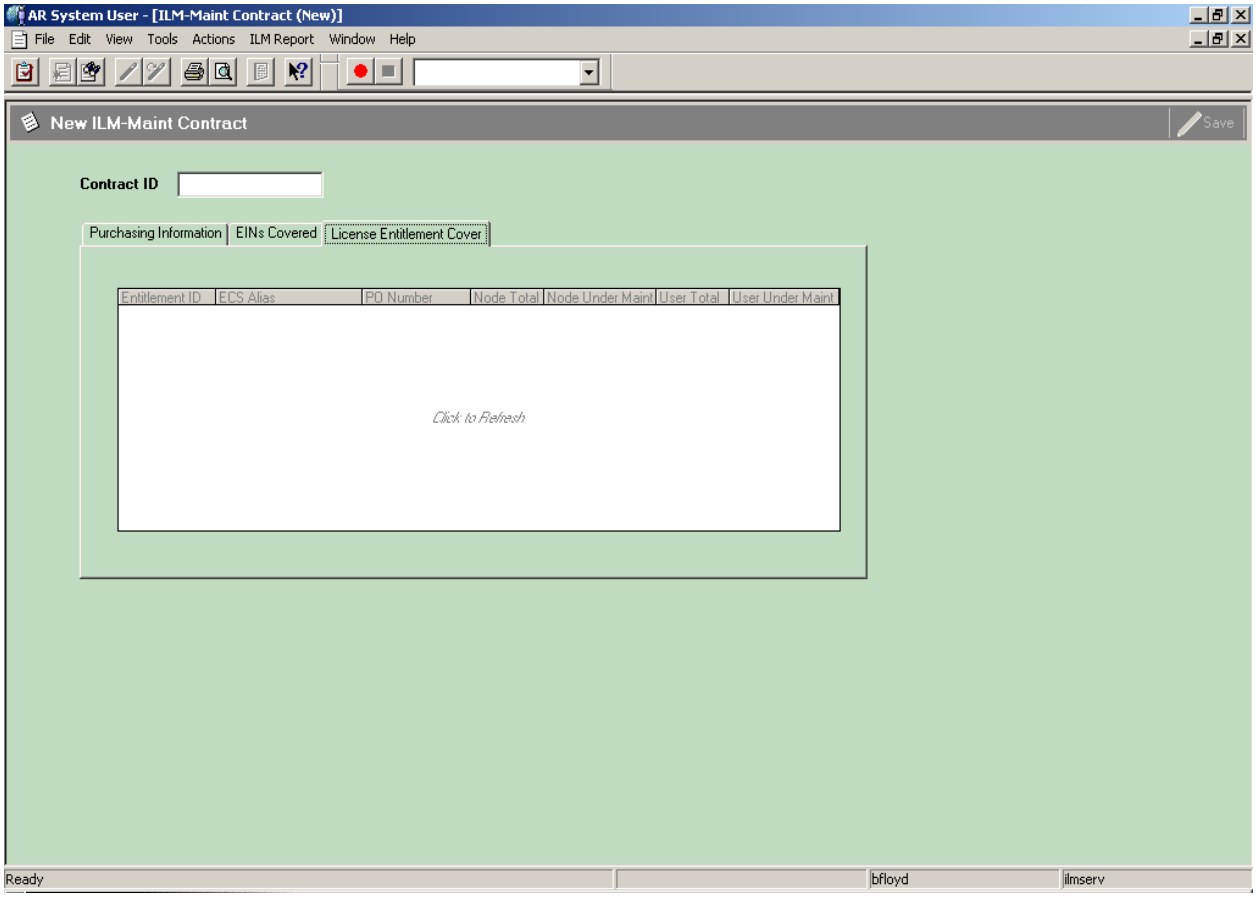


Figure 4.3.4-19. ILM-Maint Contract GUI (3 of 3)

Table 4.3.4-11 provides definitions for fields on the ILM-Maint Contract form.

Table 4.3.4-11. ILM-Maint Contract Form Fields Descriptions (1 of 2)

Field Name	Data Type	Size	Entry	Description
Contract ID	Char	10	Required	Identifier for the maintenance contract as assigned by purchasing or provided by the vendor
PO Number	Char	10	Required	Purchase order number of the purchase order that procured the maintenance coverage.
Vendor ID	Char	6	Optional	Code for the vendor with whom the contract is placed.
Maint Vendor ID	Char	6	Optional	Code for the vendor whom will provide the services
Start Date	Date	n/a	Optional	Date the contract is to become effective
Expiration Date	Date	n/a	Required	Date the contract will expire

Table 4.3.4-11. ILM-Maint Contract Form Fields Descriptions (2 of 2)

Field Name	Data Type	Size	Entry	Description
Type of Support	Char	60	Optional	Type of support procured.
Comment	Char	60	Optional	Miscellaneous information specific to the maintenance contract
Submitter	Char	30	system-supplied	The user whom created the record.
Create Date	Date		system-supplied	Date the record was created.
Last Modified By	Char	30	system-supplied	The last date the record was modified.
EINs Covered	Page	n/a	system-supplied	Page for displaying the EINs covered under the maintenance contract
License Entitlement Cover	Page	n/a	System-supplied	Page for displaying the license entitlements covered under the maintenance contract.

4.3.4.2.11 ILM-Sites GUI

This form (Figure 4.3.4-20) allows operators to maintain a set of valid standard codes and descriptions for identifying ECS sites. Each code represents one site.

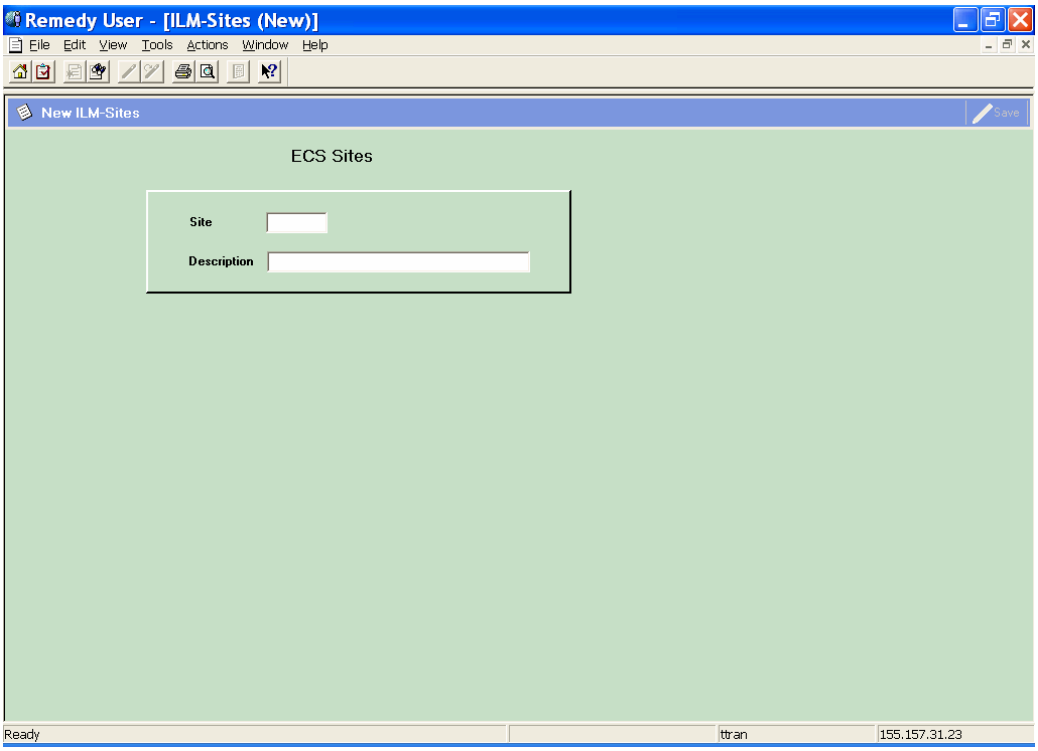


Figure 4.3.4-20. ILM-Sites GUI

Table 4.3.4-12 describes the fields on the ILM-Sites form.

Table 4.3.4-12. ILM-Sites Form Fields Descriptions

Field Name	Data Type	Size	Entry	Description
Site	Char	6	Required	Code for an ECS site.
Description	Char	40	optional	Description of the Site.

4.3.4.2.12 ILM-Inventory Location GUI

The form shown in Figure 4.3.4-21 is used to maintain information about ECS inventory locations. This standardized information is available to other screens and reports, which can access it by reference to a location.

Note: An important distinction is made in Remedy between an ECS site and an inventory location. Sites are officially designated by NASA and generally include the SMC, DAACs, and other official support installations. ECS Property Administrators designate inventory locations for purposes of property management. They are typically facilities or locales where inventory items are stored or installed and there can be more than one inventory location at a site. Inventory locations are sometimes assigned the same names and codes as a site, but Remedy treats the two as different entities.

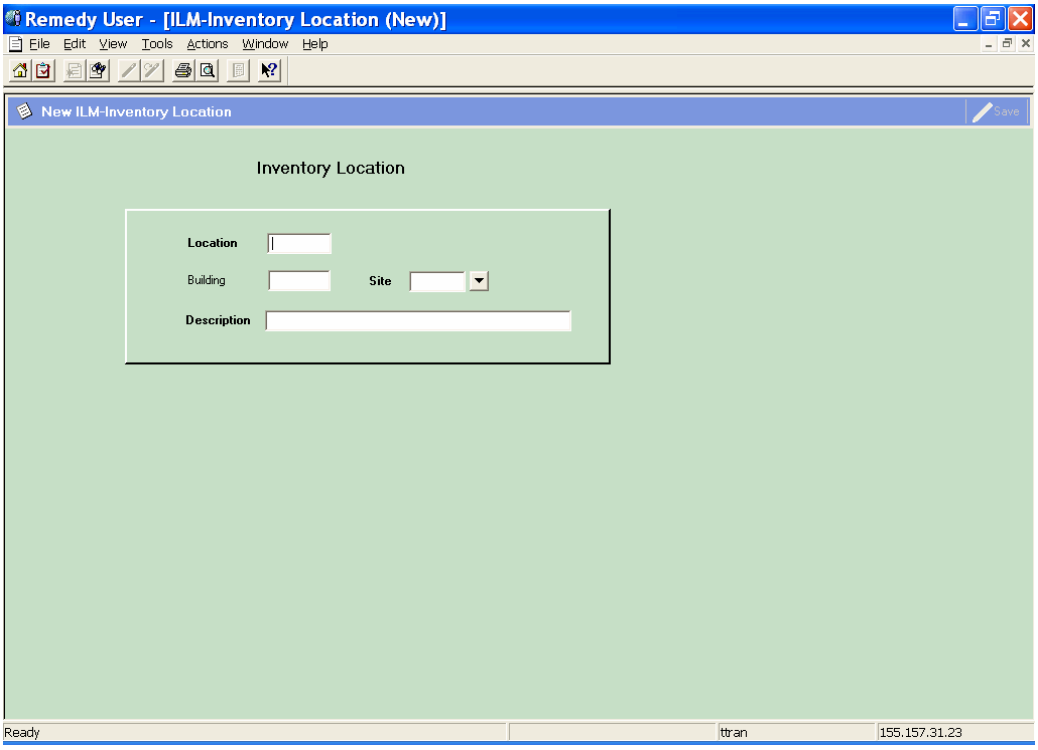


Figure 4.3.4-21. ILM-Inventory Location GUI

Table 4.3.4-13 describes the fields on the ILM-Inventory Location form

Table 4.3.4-13. ILM-Inventory Location Form Fields Descriptions

Field Name	Data Type	Size	Entry	Description
Location	Char	6	required	Identifier for the inventory location where material can be found.
Building	Char	6	optional	Building where the inventory items can be found.
Site	Char	6	required	Code for the ECS site hosting the inventory location.
Description	Char	30	required	Description for the location id.

4.3.4.3 Maintenance Management

Maintenance Work Orders (MWOs) are the heart of Remedy's Maintenance Management functionality. They are used for collecting downtime information against equipment subject to Reliability, Maintainability, and Availability (RMA) reporting as well as to identify equipment that has failed and/or been replaced during system maintenance. By way of a special feature available to the ILM-MWO and the ILM-MWO Line Item forms, operators can have the system update property records automatically based on the maintenance activities a work order describes. The following sections will describe the maintenance work order forms.

4.3.4.3.1 ILM-MWO GUI

The ILM-MWO form (Figures 4.3.4-22 to 4.3.4-25) provides the ability to create and update maintenance work orders as maintenance activity proceeds and as additional information about the repair becomes known. It also has a special feature that updates property records on demand based on events and data described in a work order's line items (ILM-MWO Line Item Form).

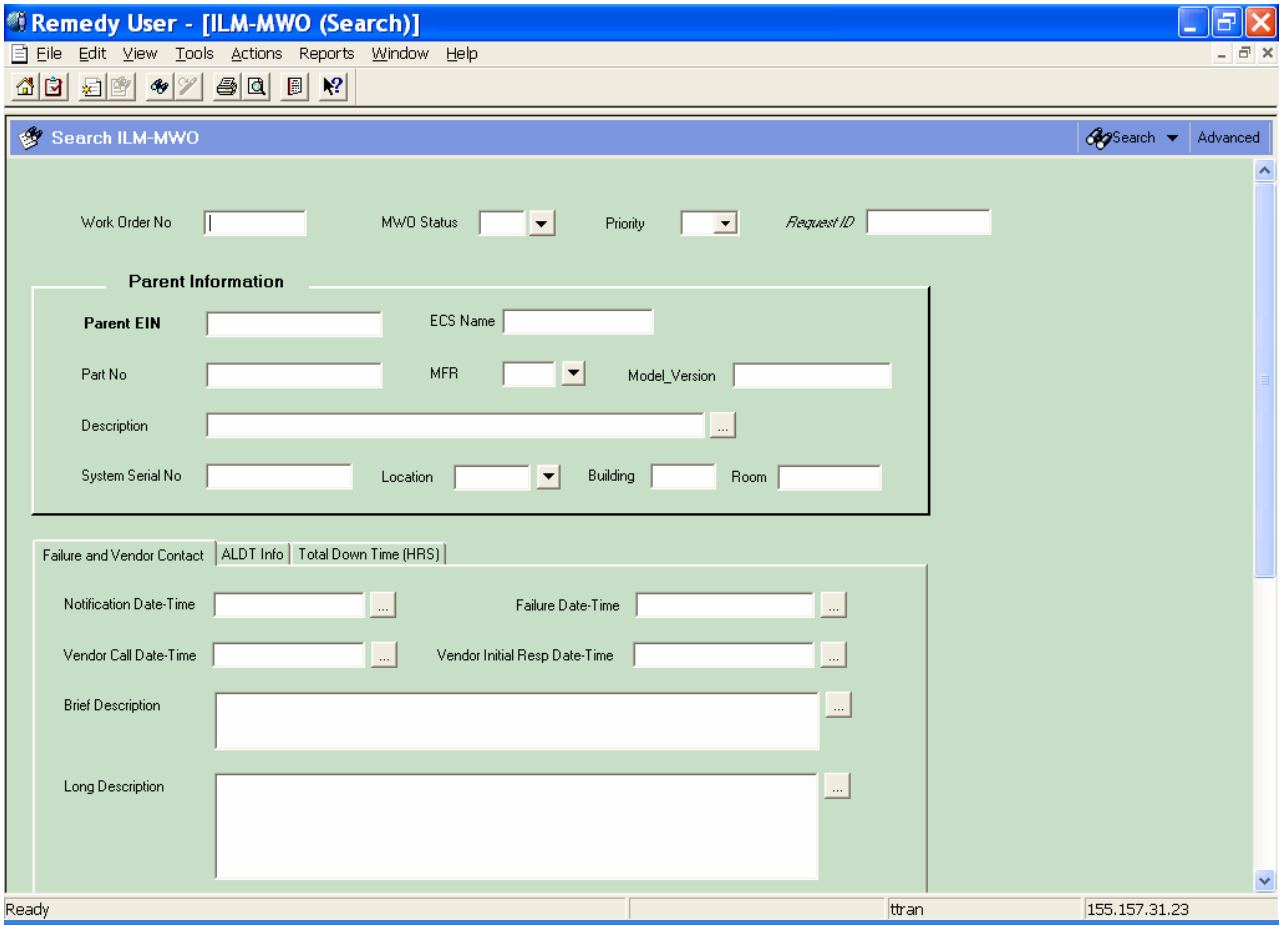


Figure 4.3.4-22. ILM-MWO GUI (1 of 4)

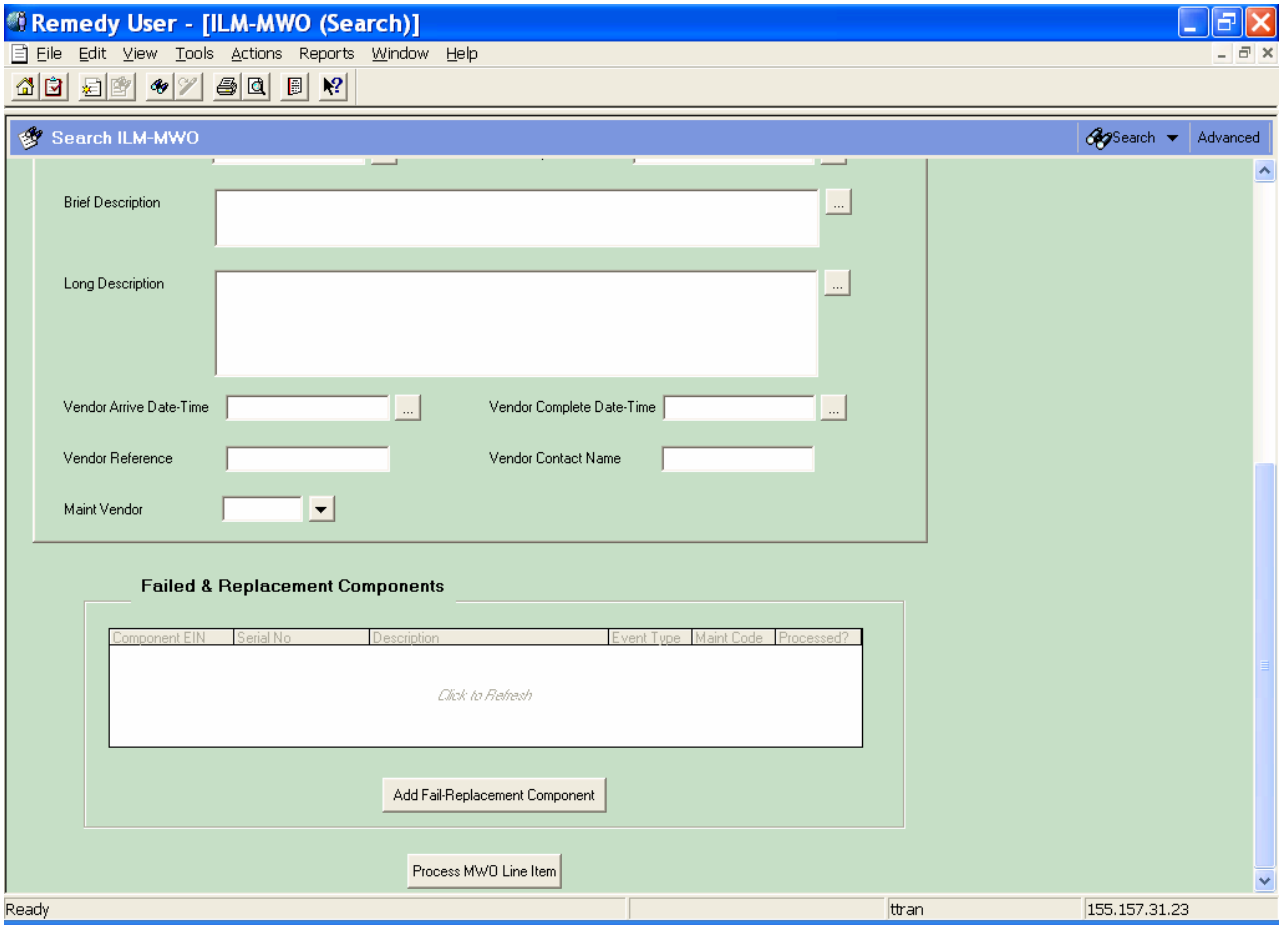


Figure 4.3.4-23. ILM-MWO Failure and Vendor Contact Tab (2 of 4)

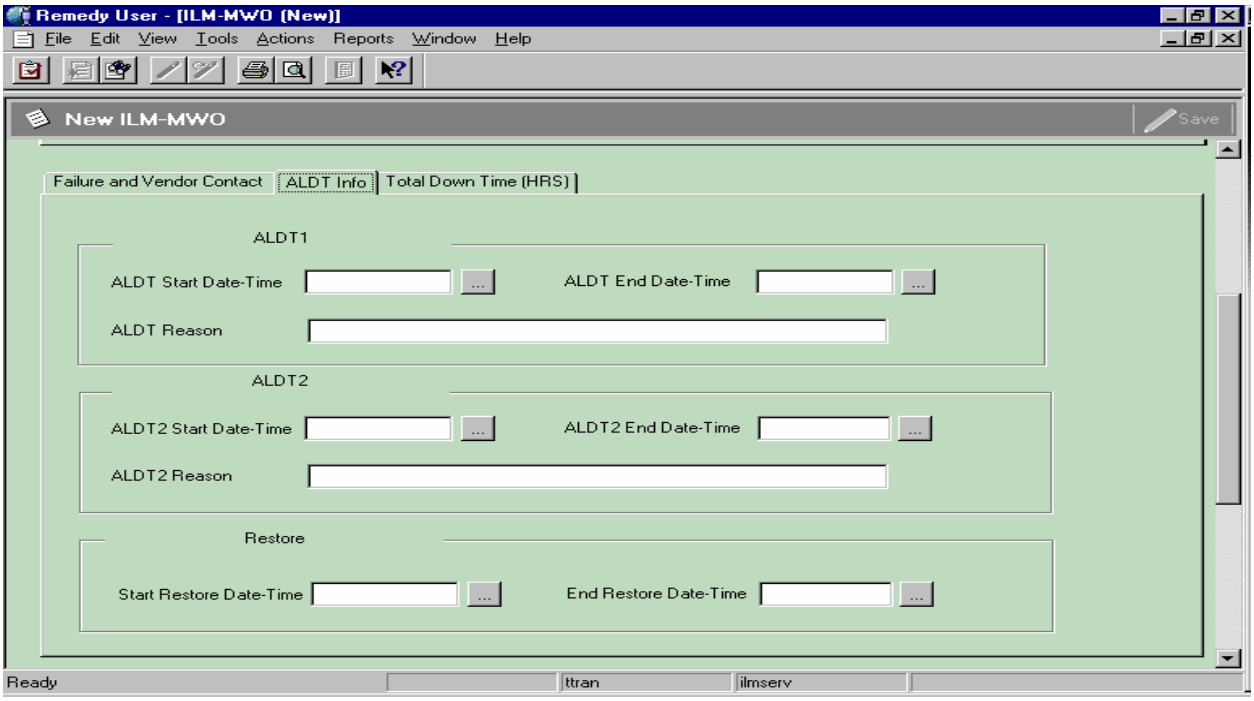


Figure 4.3.4-24. ILM-MWO ALDT Info Tab (3 of 4)

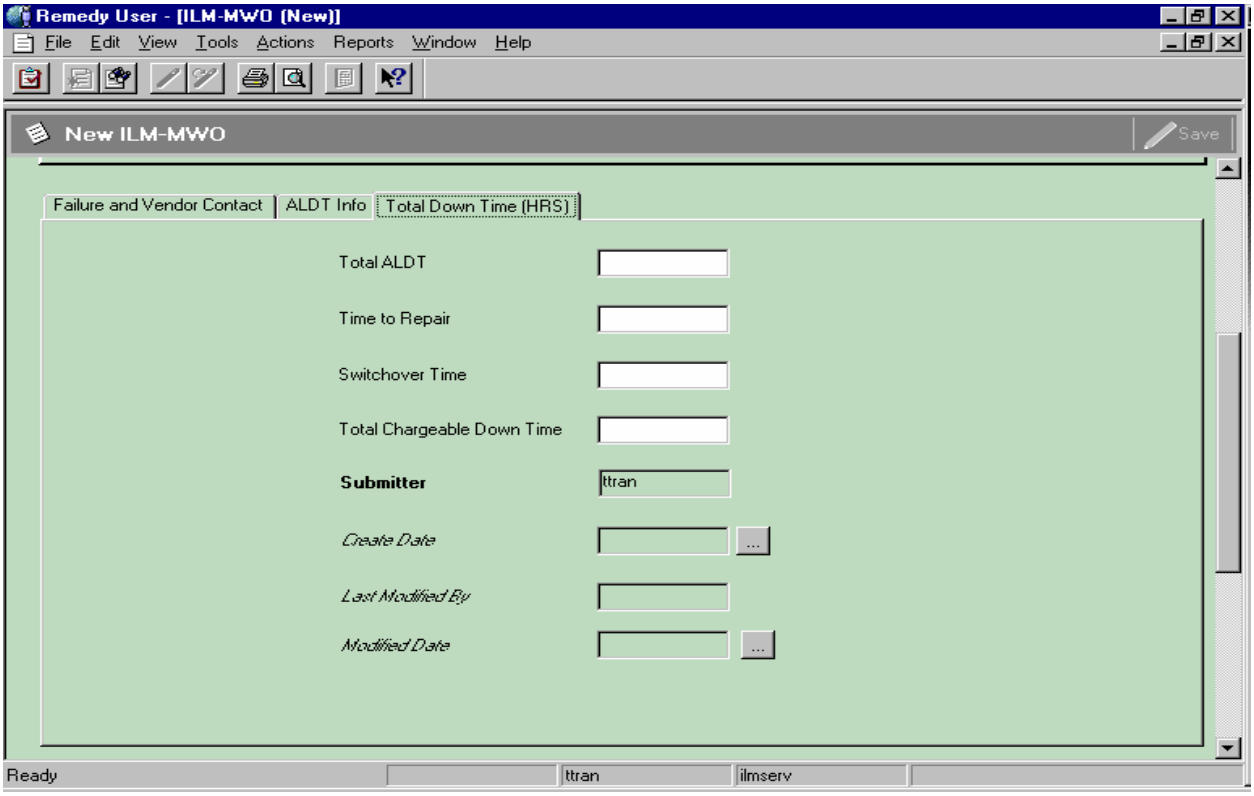


Figure 4.3.4-25. ILM-MWO Total Down Time Tab (4 of 4)

Table 4.3.4-14 describes the fields on the ILM-MWO Form.

Table 4.3.4-14. ILM-MWO Form Fields Descriptions (1 of 3)

Field Name	Data Type	Size	Entry	Description
Work Order No	Char	10	system-supplied	Identifier for the work order.
MWO Status	Char	1	optional; O, A, F, or R	Code for the status of the work order. O = Open; A = Audit; F=Finish; R = Retired.
Priority	Char	1	optional	Code for the priority assigned to the work.
Request ID	Char	15	System-supplied	Provides and displays the record identifier.
Parent EIN	Char	20	optional	EIN for the parent item in an EIN structure.
ECS Name	Char	30	system-supplied from EIN record	Name of the machine with which the item is associated.
Part No	Char	34	system-supplied from EIN record	Manufacturer's part number for the item entered as Parent EIN.
MFR	Char	6	optional	Code for the manufacturer of the item.
Model_Version	Char	24	optional	Manufacturer model number or version number for the item.
Description	Char	60	system-supplied from EIN record	Manufacturer's description for the item entered as Parent EIN.
System Serial Number	Char	30	system-supplied	Serial number of the item entered as Parent EIN.
Location	Char	8	system-supplied from EIN record	Designator for the location where the item entered as Parent EIN is situated.
Building	Char	6	optional	Building where the item will be found.
Room	Char	6	system-supplied from EIN record	Room in which the item entered as Parent EIN is situated.
Notification Date-Time	Date-Time	n/a	optional	The date and time problem was reported. This field is initialized with the current date and time but can be modified.
Failure Date-Time	Date-Time	n/a	optional	Date and time that the failure occurred.
Vendor Call Date-Time	Date-Time	n/a	optional	The date and time the maintenance vendor was called.
Vendor Initial Resp Date-Time	Date-Time	n/a	Optional	Indicate the vendor initial response date and time to the service call.
Brief Description	Char	140	Optional	A brief description of the problem and resolution
Long Description	Char	1024	optional	A long description of the problem and resolution relevant to the maintenance event

Table 4.3.4-14. ILM-MWO Form Fields Descriptions (2 of 3)

Field Name	Data Type	Size	Entry	Description
Vendor Arrive Date-Time	Date-Time	n/a	optional	The date and time the maintenance vendor actually arrived to perform the repairs.
Vendor Complete Date-Time	Date-Time	n/a	optional	Date and time the repair was completed.
Vendor Reference	Char	20	optional	Operator has option to enter any information in reference to the vendor.
Vendor Contact Name	Char	30	optional	Vendor point of contact.
Maint Vendor	Char	6	optional	Code for the vendor that provides maintenance support for this item.
ALDT Start Date-Time	Date-Time	n/a	optional	The date and time a delay in repairing the system began.
ALDT End Date-Time	Date-Time	n/a	optional	The date and time a delay in repairing the system ended.
ALDT Reason	Char	60	optional	A code for the reason a delay was encountered.
ALDT2 Start Date-Time	Date-Time	n/a	optional	The second delay date and time for when the vendor's work was suspended and resumed (including travel time, admin delays, and logistics delays).
ALDT2 End Date-Time	Date-Time	n/a	optional	The second ending date and time for the delay.
ALDT2 Reason	Char	60	optional	The reason for the second delay.
Start Restore Date-Time	Date-Time	n/a	optional	The date and time when start restoring the failed system.
End Restore Date-Time	Date-Time	n/a	optional	The date and time end restoring the system.
Total ALDT	Real	5.2	optional	Total Administrative logistic delay time (ALDT) Specified in hours.
Time To Repair	Real	5.2	optional	Time required to effect the repair. Specified in hours.
Switchover Time	Real	5.2	optional	Time required for system switch-over. Specified in hours.
Total Chargeable Down Time	Real	5.2	optional	Time to be charged for downtime. Specified in hours.
Submitter	Char	30	system-supplied	The user whom created the record.
Create Date	Date	n/a	system-supplied	Date the record was created.
Last Modified By	Char	30	system-supplied	The last date the record was modified.

Table 4.3.4-14. ILM-MWO Form Fields Descriptions (3 of 3)

Field Name	Data Type	Size	Entry	Description
Modified Date	Date	n/a	system-supplied	The last date the record was modified.
Failed & Replacement Components	Table field	n/a	System-supplied	Field for displaying the failed and replacement components.

The following buttons/functions are unique to the ILM-MWO form:

- Add Fail/Replacement Component - provides access to the ILM-MWO Line Item Form (Figure 4.3.4-27) for adding or accessing data about components involved in individual maintenance actions.
- Process MWO Line Item - The Process MWO Line Item button provides a convenient, reliable, and efficient means for updating ILM property records based on information contained in ILM-MWO line item form. New EIN records are created as necessary, as are corresponding Part No and EIN structure records. Processing adds new items to the ECS inventory, archives those that have failed or been returned to the vendor, and re-assigns any that have been relocated or returned to stock. Additionally, items returned to a vendor are rendered obsolete with respect to their parent EINs and, of those that had failed, costs are transferred to their replacements. If Remedy is to update property records based on ILM-MWO line item data, line item records must specify values for Event Type and Maint Code. They determine the type of property record changes to be made. (See Table 4.3.4-15) Additionally, operators must supply a value for New Parent EIN if an item is designated for relocation. Other line item fields, such as Component EIN, Change Date, Replacement's EIN, New Location, and New Room, have special significance as well in that they influence which database records actually change.

4.3.4.3.2 ILM-MWO Line Item GUI

The ILM-MWO Line Item form (Figures 4.3.4-26 – 4.3.4-27) provides the ability for the Local Maintenance Coordinator to identify equipment that has failed and/or been replaced during system maintenance. In general, a line item would be created for each EIN component that has failed, been replaced, or been added new. Line items can be created even if an EIN record does not exist for the component, and operators can record observed details about a repair item even if the details conflict with what is currently contained in the EIN record for the item. This form has two sections the "Database Values" and the "Observed Values". The "Database Values" displays the database value of the component EIN record if the Component EIN exists in the database. Operator may not update the fields listed in the "Database Values" section. However, the operator may update the Component EIN record in the "Observed Values" section to reflect the actual data of the Component EIN.

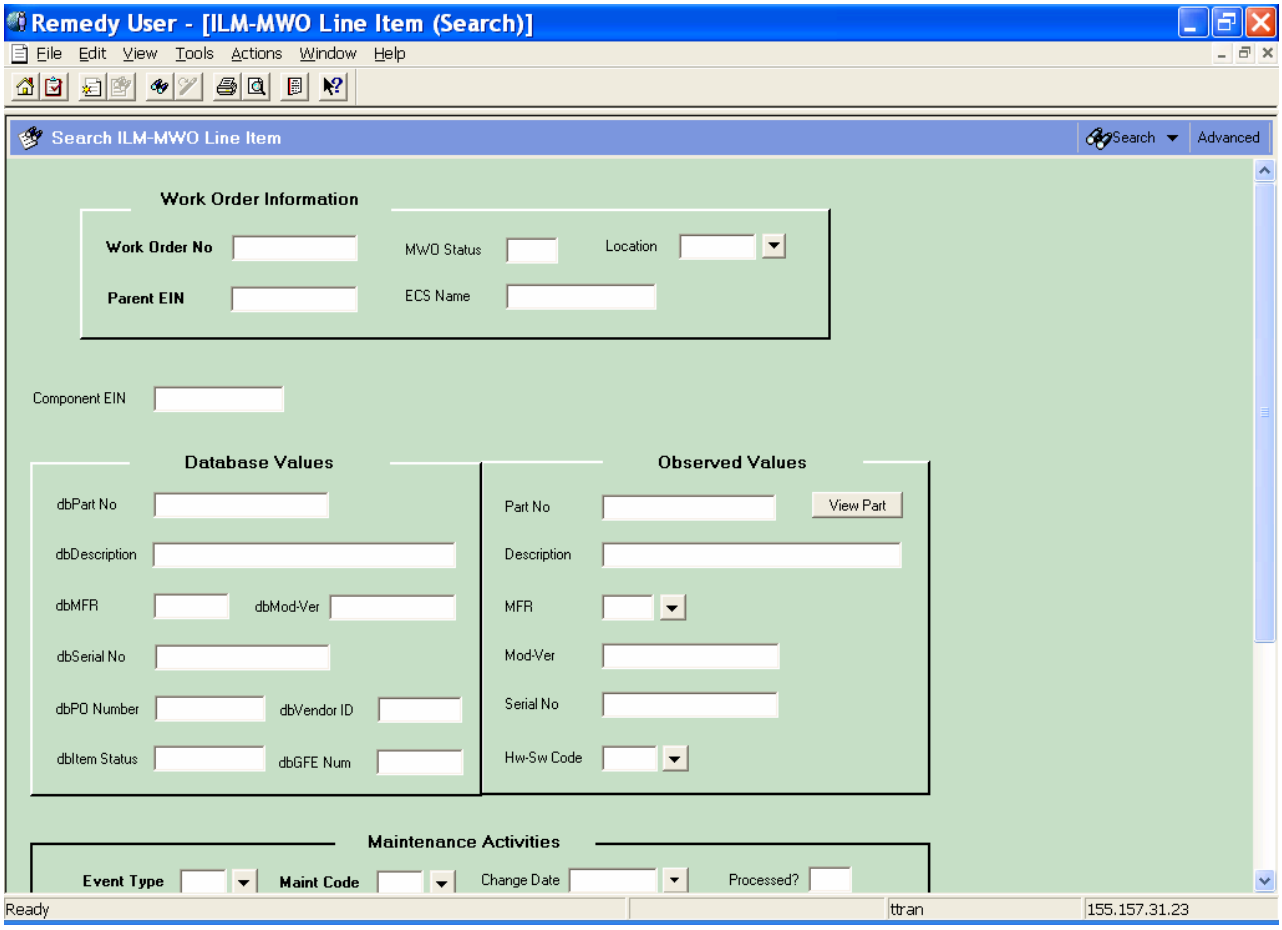


Figure 4.3.4-26. ILM-MWO Line Item GUI (1 of 2)

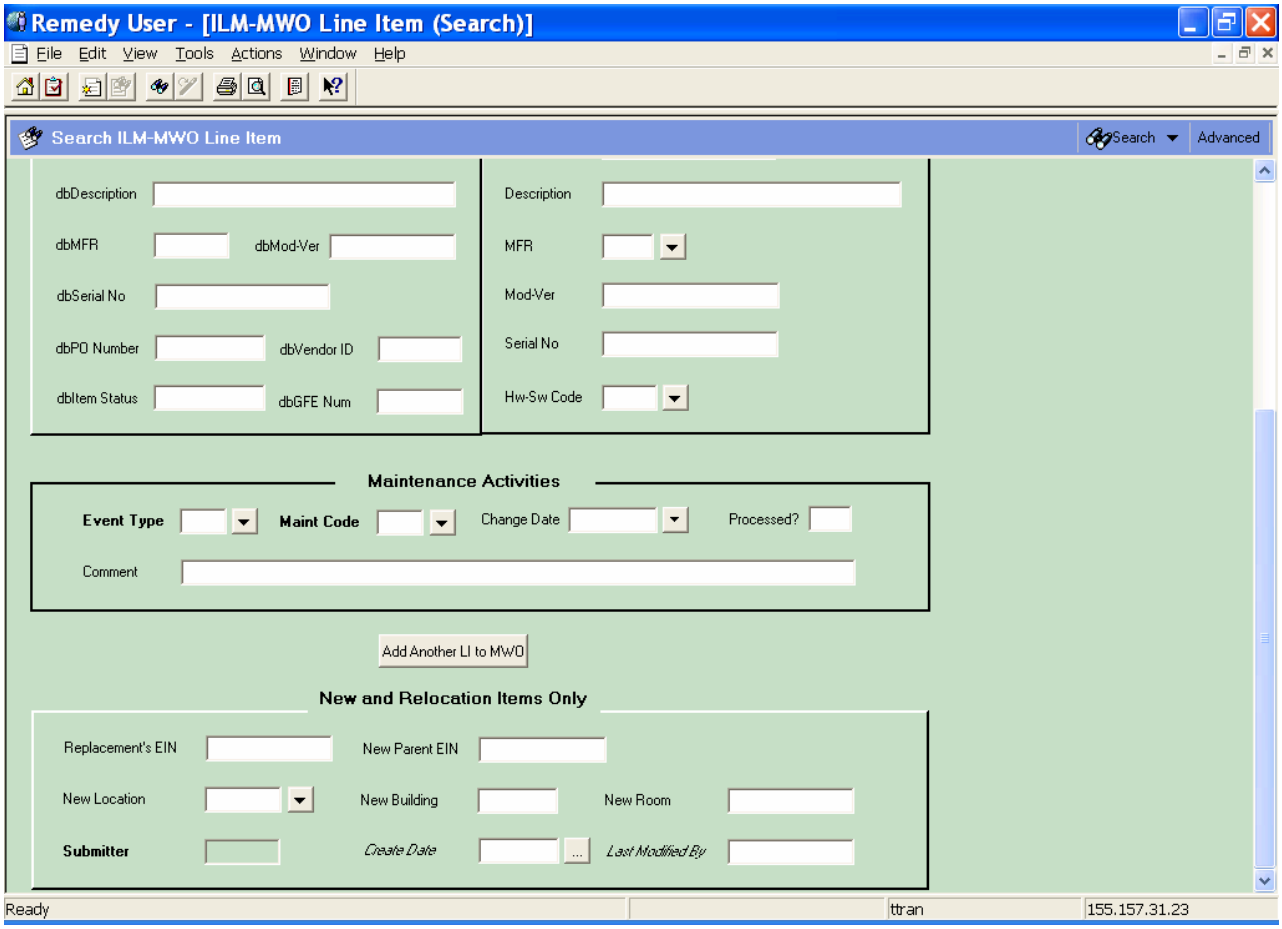


Figure 4.3.4-27. ILM-MWO Line Item GUI (2 of 2)

Table 4.3.4-15 describes the fields on the ILM-MWO Line Item form.

Table 4.3.4-15. ILM-MWO Line Item Form Fields Descriptions (1 of 3)

Field Name	Data Type	Size	Entry	Description
Work Order No	Char	10	system-supplied	Identifier for the work order.
MWO Status	Char	1	system-supplied	Code for the status of the work order. O = Open; A = Audit; F=Finish; R = Retired.
Location	Char	6	system-supplied	Location of the Parent EIN.
Parent EIN	Char	20	system-supplied	EIN for the parent item in an EIN structure.
ECS Name	Char	30	System-supplied	Name of the machine with which the item is associated.

Table 4.3.4-15. ILM-MWO Line Item Form Fields Descriptions (2 of 3)

Field Name	Data Type	Size	Entry	Description
Component EIN	Char	20	optional	Identifier for an item that is a child (component) of a parent EIN and the target of the maintenance event. If the field is left null or blank, the system will create an inventory number with a C-prefix for it automatically when the line item is processed.
Database Values Section fields	n/a	n/a	system-supplied	If the entered Component EIN record exists in the ILM-EIN form, the system will populate the fields in this section with the data derived from the ILM-EIN form record.
Observed Values Section fields	n/a	n/a	n/a	User may enter information that describes the Component EIN in this section. If the Component EIN does not exist in the database, the component EIN will be added to the database using the information provided in the fields in the Observed Values section.
Part No	Char	34	optional	Manufacturer's or vendor's part number for the item.
Description	Char	60	optional	Manufacturer's or vendor's description of the item. The operator may zoom to the OEM Parts table to choose a description, if it had been entered there previously (see the OEM Parts section).
MFR	Char	6	optional	Code used for the manufacturer of the item. The operator may zoom to the Vendor table to choose a code, if it had been entered there previously (see the Vendor Master section).
Mod-Ver	Char	24	optional	Model or Version of the item.
Serial No	Char	30	optional	Serial number of the item.
Hw-Sw Code	Char	2	Optional	Code for classifying items according to source of inventory
Event Type	Char	1	required	Code identifying a type of maintenance event (N=new item installed; F=failed item replaced; R=serviceable item replaced).
Maint Code	Char	1	required	Code designating the item's disposition. Property records are updated differently depending on the value entered. (R = Relocate, S = Stock, V = Vendor).
Change Date	Date		required	Effective date of the configuration change.
Processed?	Char	1	system supplied	Flag signifying whether or not the line item has been processed by the Work Order's .P(rocess_Changes) bottom-line command. The command updates the Component EIN's property records.
Comment	Char	60	Optional	Miscellaneous information specific to the item

Table 4.3.4-15. ILM-MWO Line Item Form Fields Descriptions (3 of 3)

Field Name	Data Type	Size	Entry	Description
Replacement's EIN	Char	20	Optional	Identifier of the new item being used as a replacement. This field is used only for items that have failed or that are being replaced (i.e., Event Type="F", or Event Type="R").
New Parent EIN	Char	20	Optional	EIN of the item to which the Component EIN is to be re-assigned. This field is applicable only to components that have failed or are being replaced (Event Type="F" or "R"), and are being relocated (Maint Code="R"). *The value must be supplied or the item will not get processed.*
New Location	Char	6	optional	Code for the new inventory location to which the item is to be assigned. This field is used for items that have failed or are being replaced (i.e., Event Type="R") and are being returned to stock.
New Building	Char	6	optional	Building where the item is to be installed.
New Room	Char	15	optional	Room where the item is to be installed.
Submitter	Char	30	system-supplied	The user whom created the record.
Create Date	Date		system-supplied	Date the record was created.
Last Modified By	Char	30	system-supplied	The last date the record was modified.

The following buttons are unique to this form:

- View Part – displays the record of the Part No. if it exists in the database.
- Add Another LI to MWO – brings up the MWO Line Item form to facilitate another line item record entry.

Table 4.3.4-16 lists the appropriate combinations of event types and maintenance codes and their effects on property records when processed.

Table 4.3.4-16. Effects on Property Records by MWO Line Item Processing (1 of 4)

Event Type	Maint Code	Property Record Updates

F
(Failed)
	S
	(Stock)
		Situation: an item has failed and has been returned to stock.
		EIN records:
		• Creates a record if one doesn't exist for the specified component EIN
		• For the specified component EIN:
		  • Clears its Parent EIN
		  • Clears its installation date
		  • Sets Item status to "F"
		  • Sets audit date to the Change Date
		  • Sets ECS name to "IN STOCK"
		  • Sets location, building, and room to new values.
		OEM part records:
		• Creates an OEM Part record if "observed values" for Part No, MFR, and Description are specified and the part record doesn't already exist
		EIN structure records:
		• Obsoletes the specified component EIN in EIN Structures where it is active. The structure is rendered inactive as of the specified Change Date
		Inventory transaction records:
		• Creates an entry for event of type "MFS" for the specified component

F
(Failed)
	V
	(Vendor)
		Situation: an item has failed and has been returned to the vendor.
		EIN records:
		• If the Component EIN field is blank, the system will not process the record and sets the Process field to "X."
		• Creates a record if one doesn't exist for the specified component EIN
		• For the specified component EIN:
		  • Clears its Parent EIN
		  • Clears its installation date
		  • Sets item status to "X"
		  • Sets audit date to the Change Date
		  • Sets ECS name to "ARCHIVE"
		  • Sets location to "EDFARC" and clears the building and room values.
		OEM part records:
		• Creates an OEM Part record if "observed values" for Part No, MFR, and Description are specified and the part record doesn't already exist
		EIN structure records:
		• Obsoletes the specified component EIN in EIN Structures where it is active. The structure is rendered inactive as of the specified Change Date
		Inventory transaction records:
		• Creates an entry for event of type "MFV" for the specified component

Table 4.3.4-16. Effects on Property Records by MWO Line Item Processing (2 of 4)

Event Type	Maint Code	Property Record Updates

N
(New)
	S
	(Stock)
		Situation: the replacement item is new and is taken from stock.
		EIN records:
		• Creates a record if one doesn't exist for the specified component EIN
		• For the specified component EIN:
		  • Sets the Parent EIN to the MWO's Parent EIN
		  • Sets installation date to the Change Date
		  • Sets item status to "I"
		  • Sets audit date to the Change Date
		  • Sets ECS name to that of the Parent EIN specified for the MWO itself
		  • Sets location and room values to that of the Parent EIN specified for the MWO
		OEM part records:
		• Creates an OEM Part record if "observed values" for Part No, MFR, and Description are specified and the part record doesn't already exist
		
		EIN structure records:
		• Obsoletes the specified component EIN in EIN Structures where it is active, if any. The structure is rendered inactive as of the specified Change Date
		• Adds the EIN as a component of the item specified as a component of the MWO's Parent EIN. The structure is rendered active as of the Change Date specified
		
		Inventory transaction records:
		• Creates an entry for event of type "MNS" for the specified component

Table 4.3.4-16. Effects on Property Records by MWO Line Item Processing (3 of 4)

Event Type	Maint Code	Property Record Updates

N
(New)
	V
	(Vendor)
		Situation: the replacement item is new and came from the vendor.
		EIN records:
		• Creates a record if one doesn't exist for the specified component EIN
		• For the specified component EIN:
		  • Sets the Parent EIN to the MWO's Parent EIN
		  • Sets installation date to the Change Date
		  • Sets receive date to the Change Date
		  • Sets item status to "I"
		  • Sets audit date to the Change Date
		  • Sets ECS name to that of the Parent EIN specified for the MWO itself
		  • Sets location, building, and room values to that of the Parent EIN specified for the MWO itself
		  • If the component is replacing an EIN specified in a separate line item as a failed item being returned to the vendor and copies the item cost from the EIN record for the failed item to the EIN record for the new item
		• For a failed item being replaced by the specified component EIN:
		  • Sets cost to 0
		
		OEM part records:
		• Creates an OEM Part record if "observed values" for Part No, MFR, and Description are specified and the part record doesn't already exist
		
		EIN structure records:
		• Obsoletes the specified component EIN in EIN Structures where it is active, if any. The structure is rendered inactive as of the specified Change Date
		• Adds the EIN as a component of the item specified as a component of the MWO's Parent EIN. The structure is rendered active as of the Change Date specified
		
		Inventory transaction records:
		• Creates an entry for event of type "MNV" for the specified component

Table 4.3.4-16. Effects on Property Records by MWO Line Item Processing (4 of 4)

Event Type	Maint Code	Property Record Updates

R (Replaced)	R (Relocate)	Situation: an item is being relocated to a new machine.
		EIN records:
		• Creates a record if one doesn't exist for the specified component EIN
		• For the specified component EIN:
		  • Sets the Parent EIN to the New Parent EIN
		  • Sets the Installation Date to Change Date
		  • Sets item status to "I"
		  • Sets audit date to the Change Date
		  • Sets ECS name to the name of the new parent EIN
		  • Sets location, building, and room to that of the new parent EIN
		OEM part records:
		• Creates an OEM Part record if "observed values" for Part No, MFR, and Description are specified and the part record doesn't already exist
		EIN structure records:
		• Obsoletes the specified component EIN in EIN Structures where it is active. The structure is rendered inactive as of the specified Change Date
		• Adds the EIN as a component of the item specified as New Parent EIN. The structure is rendered active as of the specified Change Date
		Inventory transaction records:
		• Creates an entry for event of type "MRR" for the specified component

R (Replaced)	S (Stock)	Situation: an item is being returned to stock.
		EIN records:
		• Creates a record if one doesn't exist for the specified component EIN
		• For the specified component EIN:
		  • Sets the Parent EIN to blank
		  • Clears its installation date
		  • Sets item status to "R"
		  • Sets audit date to the Change Date
		  • Sets ECS name to "IN STOCK"
		  • Sets location, building, and room to new values, if specified
		OEM part records:
		• Creates an OEM Part record if "observed values" for Part No, MFR, and Description are specified and the part record doesn't already exist
		EIN structure records:
		• Obsoletes the specified component EIN in EIN Structure where it is active. The structure is rendered inactive as of the specified Change Date
		•
		Inventory transaction records:
		• Creates an entry for event of type "MRS" for the specified component

4.3.4.4 License Management

Many software products used in EMD are licensed; that is, subject to conditions of limiting how many users can run the product and where. Licenses take numerous forms. Nodelock licenses let users run the product, but only on a designated machine; counted nodelock licenses limit the number of users that can run the product on that machine. Floating licenses allow users to run a product from any machine in a network. They may limit the number of users that can run the product concurrently, the number of servers that can be used concurrently, the number of sites that can use the product, or any combination of the above. Licenses can apply to a named product, one or more of its features, one or more of its versions, and/or one or more types of platforms. Some vendors enforce these provisions through use of license keys, but ECS is accountable for adhering to licensing provisions whether vendors use keys or not.

The life cycle for licensed COTS software encompasses developmental and systems engineering, purchasing, receiving, stocking, distribution, installation, use, and recovery. Licenses associated with COTS products are obtained and allocated; they also expire. Licenses do not always change when the licensed product does.

When purchasing a product or obtaining an upgrade, engineering determines what licensing provisions are required. Depending on the product, license entitlements may appear as separate line items on purchase orders, but often not. (For example, purchased licensing provisions may be provided with the product; that is, not purchased separately.) License certificates (rights to certify) typically accompany software when it arrives and, in the case of operating system software, accompanies the computers themselves. These certificates describe the licensing provisions that were purchased and may carry an associated cost. Sometimes, the certificates include a license key, but usually they represent the right to obtain keys.

Multiple licenses are sometimes obtained from the product vendor under the provisions of a single license certificate. Each license would account for part of the rights-to-use under the certificate. Conversely, individual licenses can consume rights-to-use from more than one certificate. Each unique license key implies a unique license, but not every license has a key.

Licenses are allocated to the sites and host machines where their keys are installed, and keyless licenses are allocated to where their software products are installed. This is not so much for property accounting (i.e., cost accounting), but to verify adherence to purchased licensing provisions and to identify where licenses are used in case rights-to-use must transfer elsewhere. A single license can be allocated to multiple sites and machines, although it's unclear at present whether a machine's current location determines the license's allocation site.

License rights-to-use are counted differently depending on the type of licenses purchased. Rights for nodelock license are allocated and counted by node and are consumed at the rate of one license per node. Floating license rights are allocated and counted based on number of users on a network rather than by specific machines, where the network is represented by a machine on which the license is installed. Floating license rights are consumed at the rate of number of users per license. Occasionally, a purchased entitlement covers a total number of users across a limited number of machines. In this case, rights are consumed at the rate of one license per node as well as number of users per license.

The following forms provide the SLA capabilities to manage software licenses.

- ILM-License Products – to maintain standardized information about manufacturer's part numbers.
- ILM-License Entitlement – to maintain records of purchased rights-to-use for licensed software.
- ILM-License – to maintain records of software licenses obtained from vendors and maintains license allocation.
- ILM-License Mapping – manages the mapping of a license to purchased entitlements.
- ILM-Additional Host – identifies redundant or backup server machines on which the license will be installed

4.3.4.4.1. ILM-License Product GUI

This form (Figure 4.3.4-28) provides the SLA the ability to maintain standardized information about manufacturers' part numbers for software licenses. Licenses part numbers and associated information must be recorded before they can be added to an entitlement or license via the ILM-Entitlement form or the ILM-License form.

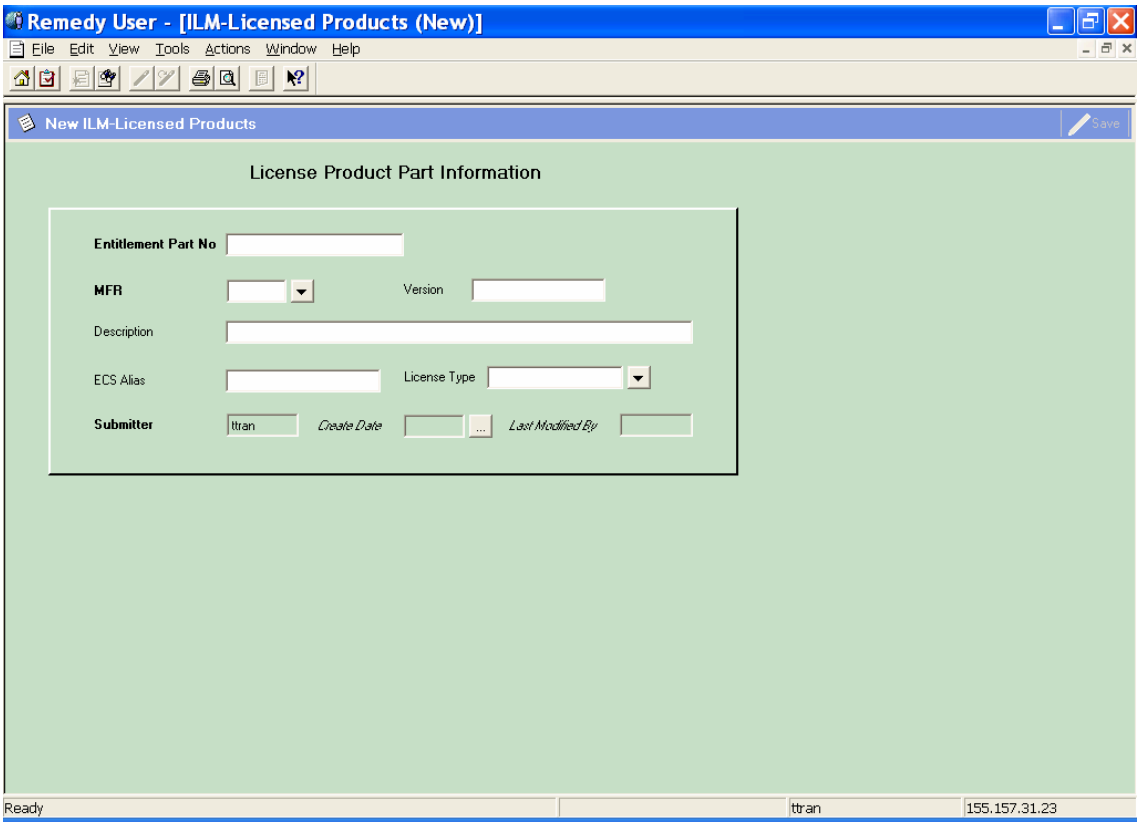


Figure 4.3.4-28. ILM-License Products GUI

Table 4.3.4-17 describes the ILM-License Products form fields definitions.

Table 4.3.4-17. ILM-Licensed Products Form Fields Descriptions

Field Name	Data Type	Size	Entry	Description
Entitlement Part No	Char	34	Required	Manufacturer's or vendor's part number for the entitlement.
MFR	Char	6	Required	Code for the manufacturer from whom the item was purchased.
Version	Char	34	Optional	Version number of the part.
Description	Char	50	Required	Manufacturer's or vendor's description for the entitlement. This field reflects the description of the OEM Part Number entered in the field above.
ECS Alias	Char	30	optional	Common name used in ECS for the licensed product and all its versions and variants.
License Type	Char	16	optional	Classification that distinguishes among licenses according to rules of use. Examples include: floating (limited number of concurrent users), nodelocked (limited to use on a single machine), user (limited to use by a certain individual), project (unlimited use anywhere by individuals working on a certain project), site (unlimited use at a single site), etc.
Submitter	Char	30	system-supplied	The user whom created the record.
Create Date	Date	n/a	system-supplied	Date the record was created.
Last Modified By	Char	30	system-supplied	The last date the record was modified.

4.3.4.4.2 ILM-License Entitlement Form

Operators use the ILM-License Entitlement form (Figures 4.3.4-29-4.3.4-31) to maintain records of purchased rights-to-use for licensed software, including how many node and user rights-to-use have been consumed, remain, and are under maintenance. Rights consumed and remaining are computed automatically based on the licenses mapped against it.

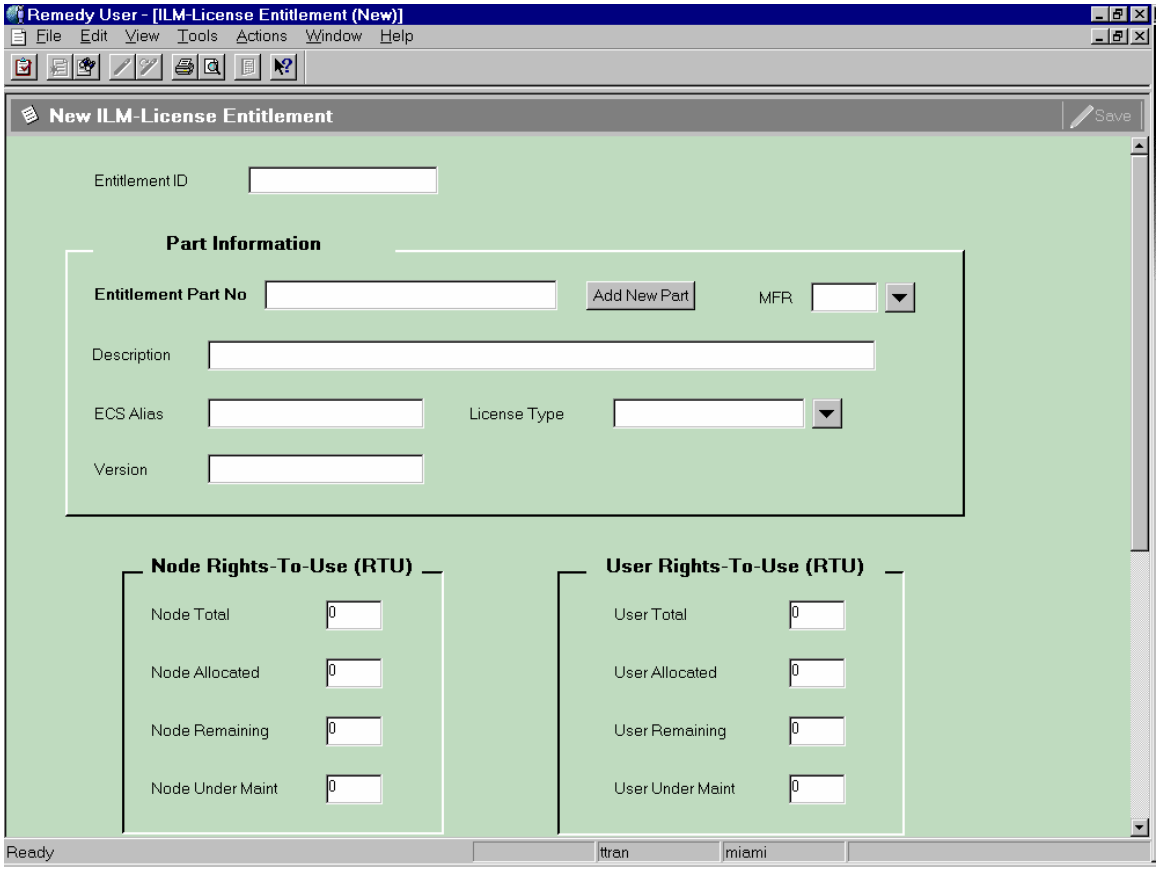


Figure 4.3.4-29. ILM-License Entitlement GUI (1 of 3)

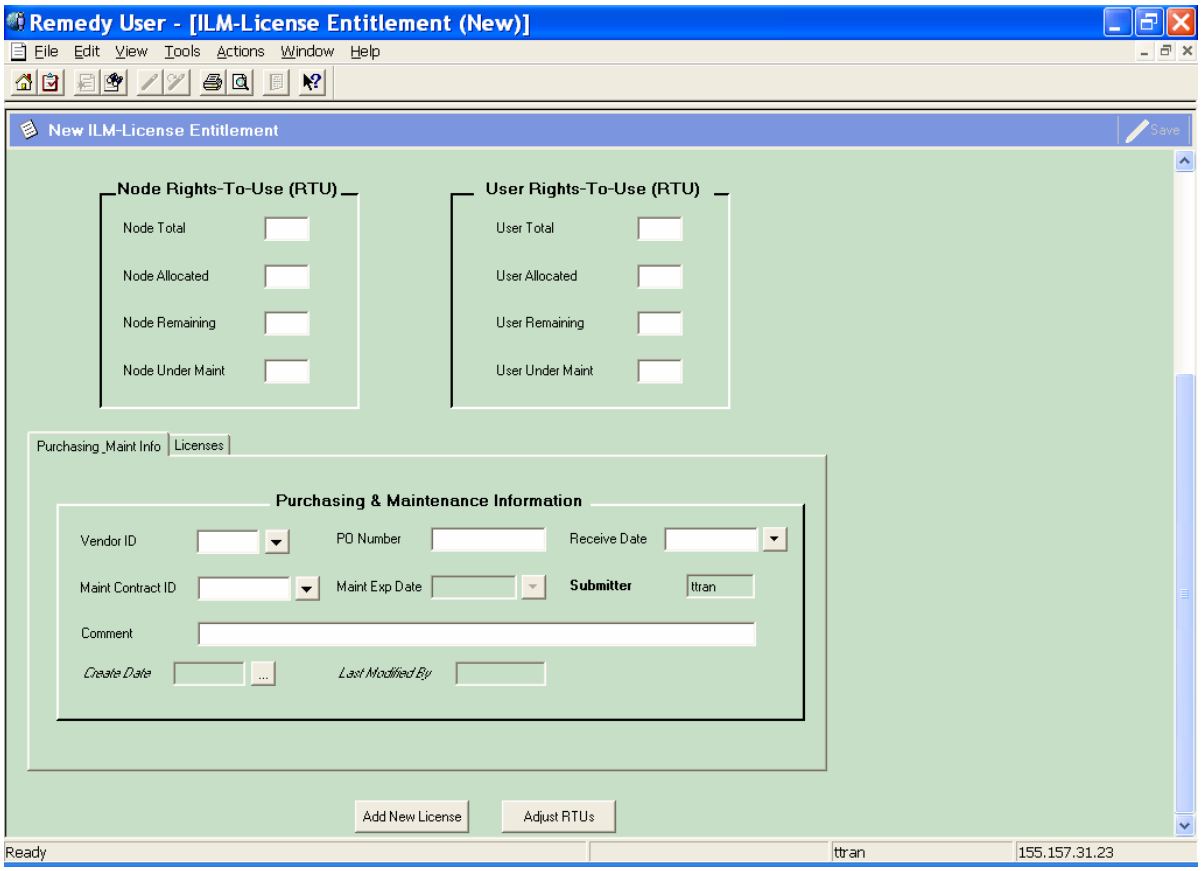


Figure 4.3.4-30. ILM-License Entitlement GUI (2 of 3)

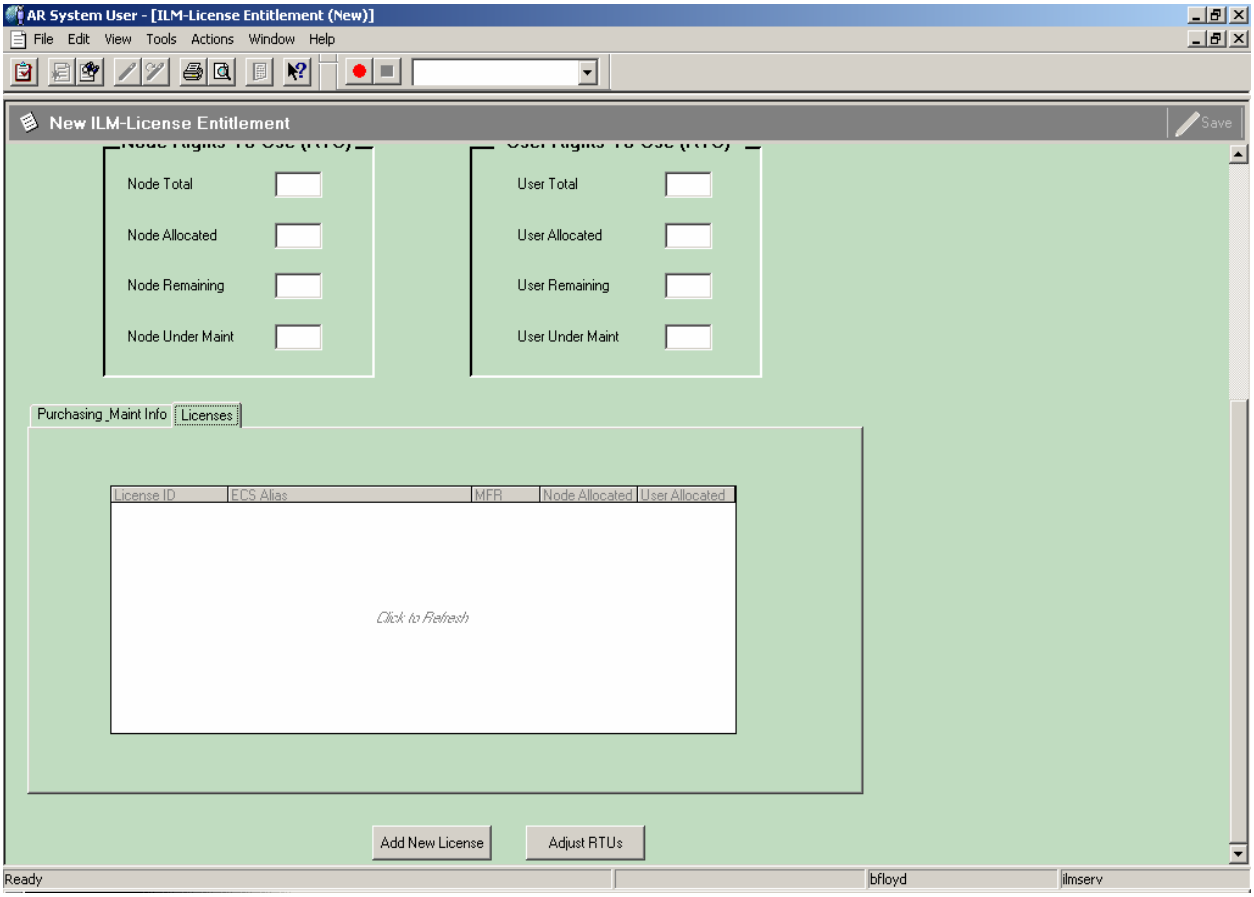


Figure 4.3.4-31. ILM-License Entitlement GUI (3 of 3)

Table 4.3.4-18 describes the ILM-License Entitlement form's field descriptions.

Table 4.3.4-18. ILM-License Entitlement Form Fields Descriptions (1 of 2)

Field Name	Data Type	Size	Entry	Description
Entitlement ID	Char	10	System supplies	Identifier for a purchased license entitlement.
Entitlement Part No	Char	34	required	Manufacturer's or vendor's part number for the entitlement.
MFR	Char	6	system supplied	Code for the manufacturer from whom the item was purchased. This field reflects the MFR of the entitlement Part No entered in the field above.
Description	Char	50	system supplied	Manufacturer's or vendor's description for the entitlement. This field reflects the description of the entitlement Part No entered in the field above.
ECS Alias	Char	30	system supplied	Common name used in ECS for the licensed product and all its versions and variants. This field reflects the ECS Alias of the entitlement Part No entered in the field above.
License Type	Char	16	system supplied	Classification that distinguishes among licenses according to rules of use. This field reflects the license type of the entitlement Part No entered in the field above.
Version	Char	34	system supplied	Version number of the part. This field reflects the version of the entitlement Part No entered in the field above.
Rights to Use (RTU) Node/User Total	Integer	8	Optional	Quantity of node or user rights-to-use authorized by this purchased entitlement.
Node/User Allocated	Integer	8	system supplied	Quantity of node or user rights under the license entitlement currently allocated by licenses mapped to the entitlement. This value is calculated by the system and reflects the total number of active allocations of those licenses.
Node/User Remaining	Integer	8	system supplied	Quantity of node or user rights under a license entitlement not yet consumed by the mapping of licenses to the entitlement.
Node/User Under Maint	Integer	8	system supplied	Quantity of node or user rights-to-use currently under maintenance.
Vendor ID	Char	6	optional	Code for the vendor from whom the item was purchased.
PO Number	Char	10	optional	Identifier of the purchase order against which the item was received.
Receive Date	Date	n/a	optional	Date item was received from vendor.
Maint Contract ID	Char	10	optional	Identifier for the Maintenance Contract under which the item is covered.
Maint Exp Date	Date	n/a	optional	Date the maintenance contract expired.

Table 4.3.4-18. ILM-Entitlement Form Fields Descriptions (2 of 2)

Field Name	Data Type	Size	Entry	Description
Comment	Char	30	Optional	Miscellaneous information specific to the item.
Submitter	Char	30	system-supplied	The user whom created the record.
Create Date	Date	n/a	system-supplied	Date the record was created.
Last Modified By	Char	30	system-supplied	The last date the record was modified.
Licenses	Page	n/a	system-supplied	This page lists the licenses that are associated with the license entitlement record.

The following buttons are unique to this form:

- Add New Part – Activates the ILM-License Entitlement Part form. This allows the operator to add new parts.
- Add New License – Displays the ILM-License form (Figure 4.3.4-32) to allow the SLA to add new licenses.
- Adjust RTUs – Facilitates adjustments of the right-to-use numbers.

4.3.4.4.3ILM-License GUI

The ILM-License form (Figures 4.3.4-32 – 4.3.4-35) maintains records of software licenses obtained from vendors. This form also maintains records about the hosts and sites to which the licenses have been allocated. Licenses can be mapped to purchase license entitlements so that consumption of license rights can be tracked.

A license is a euphemism for the rights granted a number of user to operate a software product or one or more of the product's versions or features concurrently on certain machines. These rights are often encoded in a license "key", but not all products employ such keys.

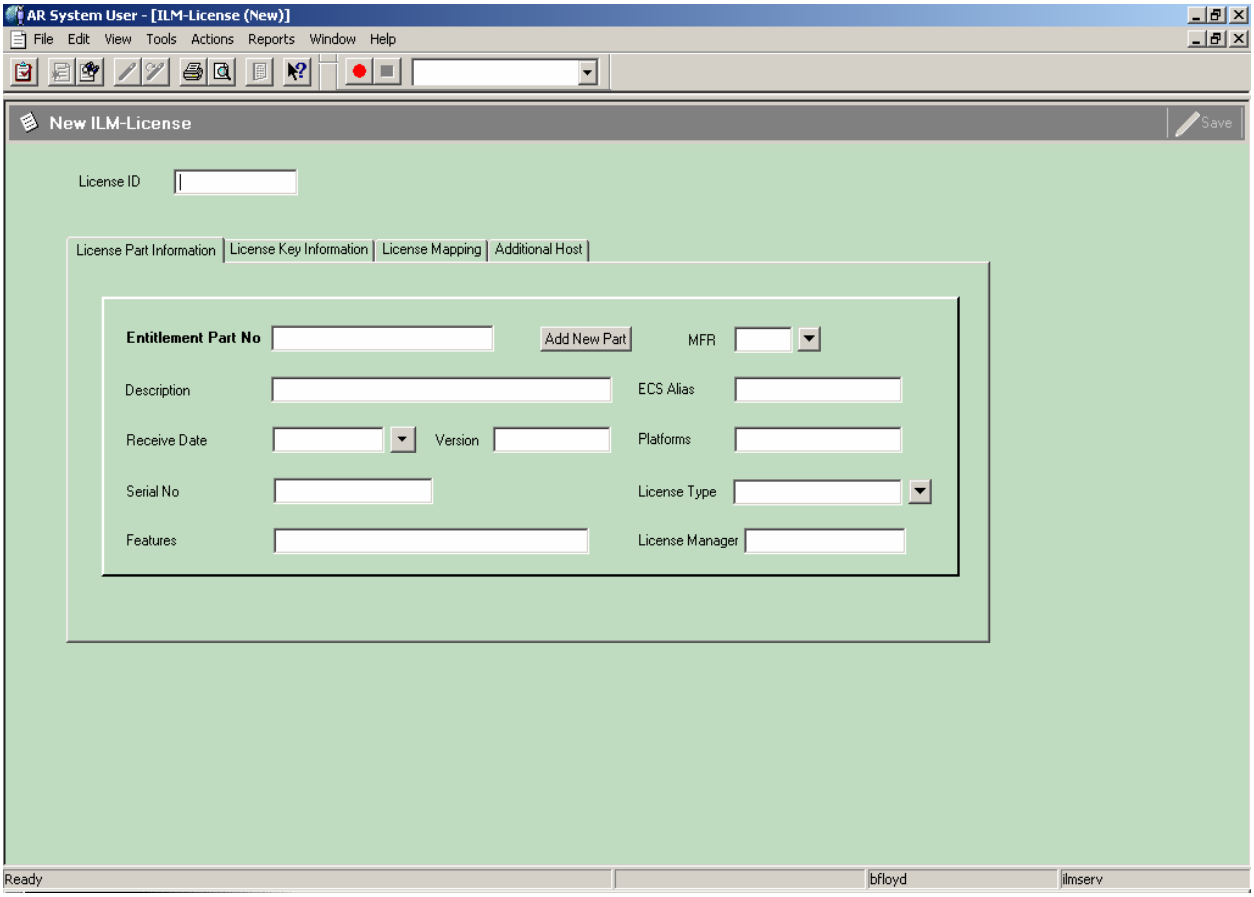


Figure 4.3.4-32. ILM-License GUI (1 of 4)

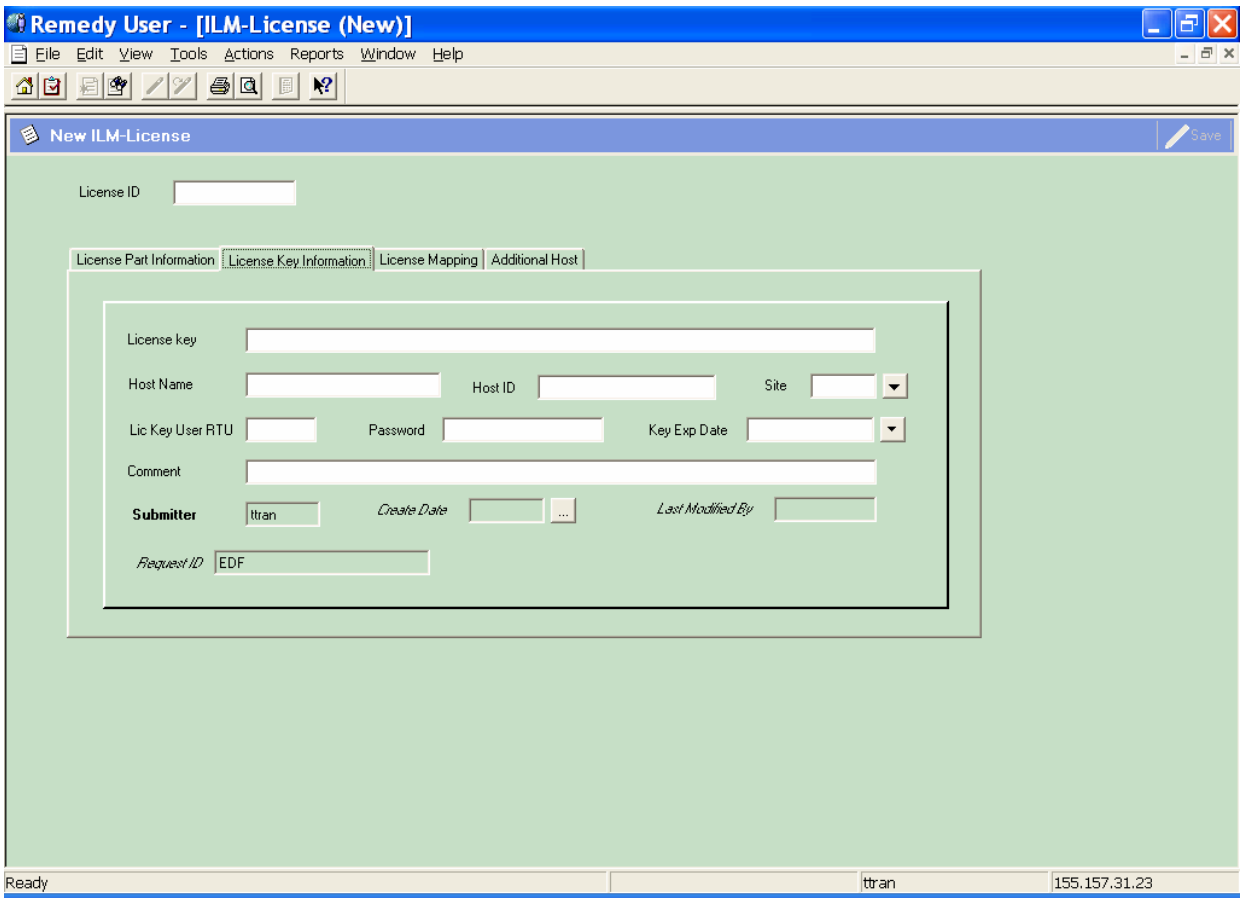


Figure 4.3.4-33. ILM-License GUI (2 of 4)

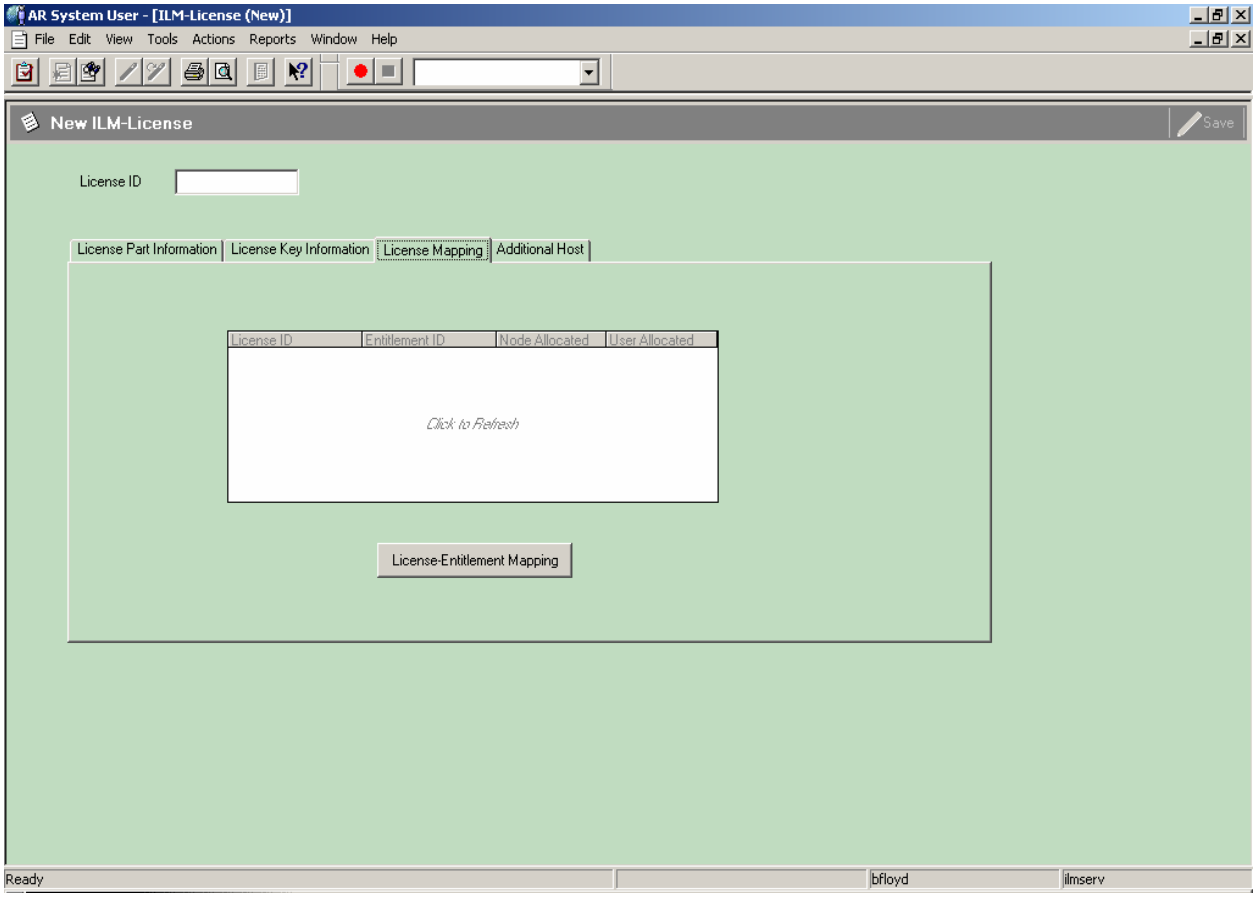


Figure 4.3.4-34. ILM-License GUI (3 of 4)

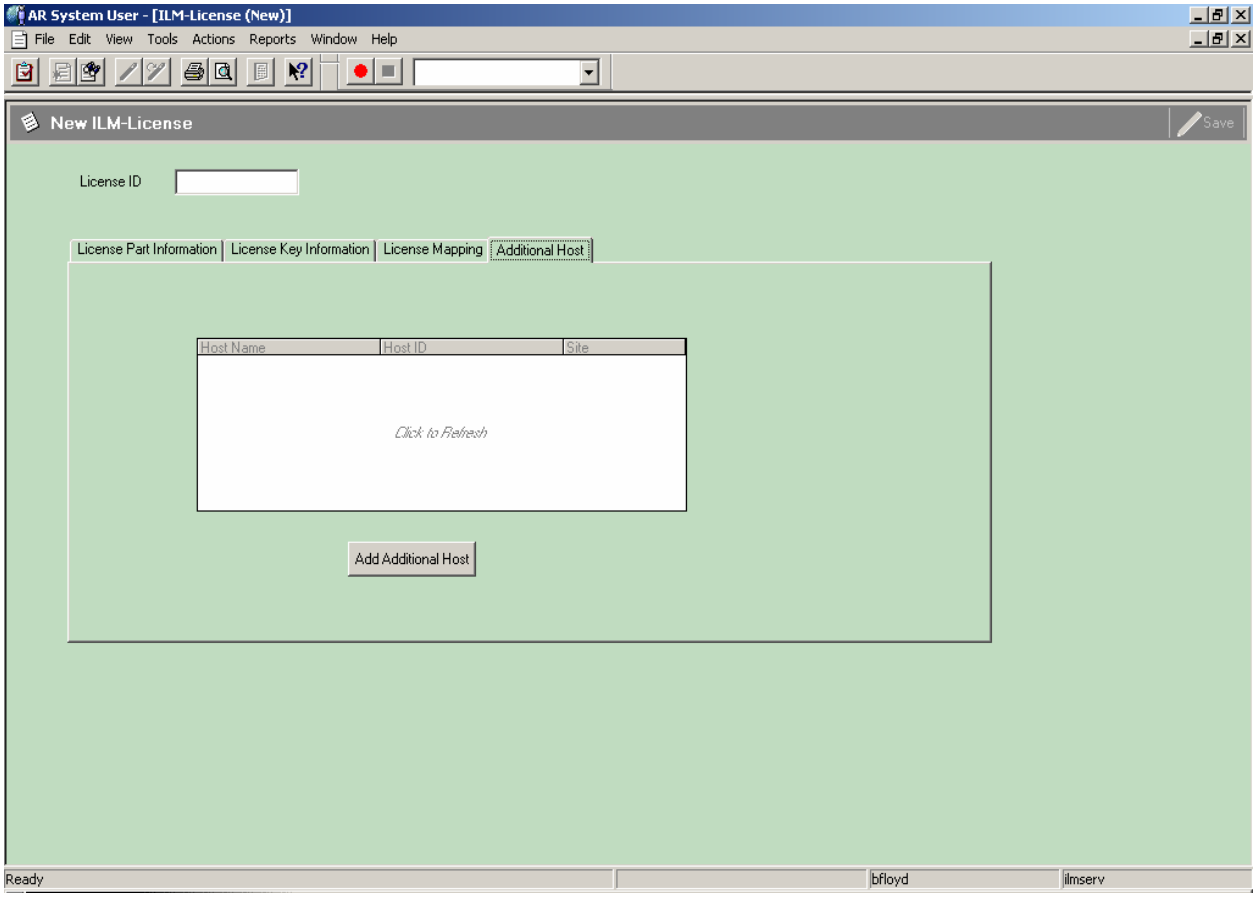


Figure 4.3.4-35. ILM-License GUI (4 of 4)

Table 4.3.3-19 provides fields definitions for the ILM-License form.

Table 4.3.4-19. ILM-License Form Fields Descriptions (1 of 3)

Field Name	Data Type	Size	Entry	Description
License ID	Char	10	System Supplies	Unique designator for a license.
Entitlement Part No	Char	34	required	Manufacturer's or vendor's part number for the entitlement.
MFR	Char	6	system supplied	Code for the manufacturer from whom the item was purchased. This field reflects the MFR of the entitlement Part No entered in the field above.
Description	Char	50	system supplied	Manufacturer's or vendor's description for the entitlement. This field reflects the description of the entitlement Part No entered in the field above.

Table 4.3.4-19. ILM-License Form Fields Descriptions (2 of 3)

Field Name	Data Type	Size	Entry	Description
ECS Alias	Char	30	system supplied	Common name used in ECS for the licensed product and all its versions and variants. This field reflects the ECS Alias of the entitlement Part No entered in the field above.
Receive Date	Date	n/a	optional	Date the license key and/or data arrived.
Version	Char	34	system supplied	Version number of the part. This field reflects the version of the entitlement Part No entered in the field above.
Platforms	Char	15	optional	One or more codes for the types of machines to which the license applies (e.g., Sun, SGI, PC, etc.)
Serial No	Char	30	optional	Vendor-supplied serial number for the license or the product being licensed.
License Type	Char	16	system supplied	Classification that distinguishes among licenses according to rules of use. This field reflects the license type of the entitlement Part No entered in the field above.
Features	Char	54	optional	Name(s) of one or more features of the licensed product that are covered by the license.
License Manager	Char	12	optional	Technology employed in managing the license on-line (e.g., flexlm, proprietary, etc.)
License Key	Char	50	optional	Char of alphanumeric characters that represent the provisions for a license in an encoded form.
Host Name	Char	30	optional	ECS Name of a machine to which the license is allocated.
Host ID	Char	20	optional	Host id of the license server machine supplied to the vendor when requesting the license. This is an information only field. Allocations of licenses to machines are accomplished via the License Allocation Manager screen.
Site	Char	6	Optional	Code for the site to which the license is allocated.
Lic Key User RTU	Integer	8	optional	Number of users authorized by the license to run the licensed product concurrently on a single network. This value limits the user rights-to-use that can be recorded in the license's allocation records.
Password	Char	20	optional	Password supplied along with the license key by the vendor. This is an information only field.
Key Exp Date	Date	n/a	optional	Date on which the license key is no longer usable.
Comment	Char	60	optional	Comment to be stored in the record.
Submitter	Char	30	system-supplied	The user whom created the record.

Table 4.3.4-19. ILM-License Form Fields Descriptions (3 of 3)

Field Name	Data Type	Size	Entry	Description
Create Date	Date	n/a	system-supplied	Date the record was created.
Last Modified By	Char	30	system-supplied	The last date the record was modified.

The following buttons are unique to this form:

- Add New Part – Activates the ILM-License Product form. This allows the operator to add new parts.
- Add Additional Host – activates the ILM-Additional host form to allow the SLA to add redundant host or backup server to the license.
- License-Entitlement Mapping - activates the ILM-License Mapping form that allows the SLA to map the license to the purchased entitlement.

4.3.4.4.4 ILM-License Mapping GUI

The ILM-License Mapping form (Figure 4.3.4-36) manages the mapping of a license to purchased entitlements and specifies how many node and/or user rights-to-use the license is consuming from each. The form ensures that:

a) the rights-to-use attributed to an entitlement do not exceed the entitlement's rights remaining;

b) the sum of the rights being attributed to all entitlements do not exceed the rights-to-use for the license.

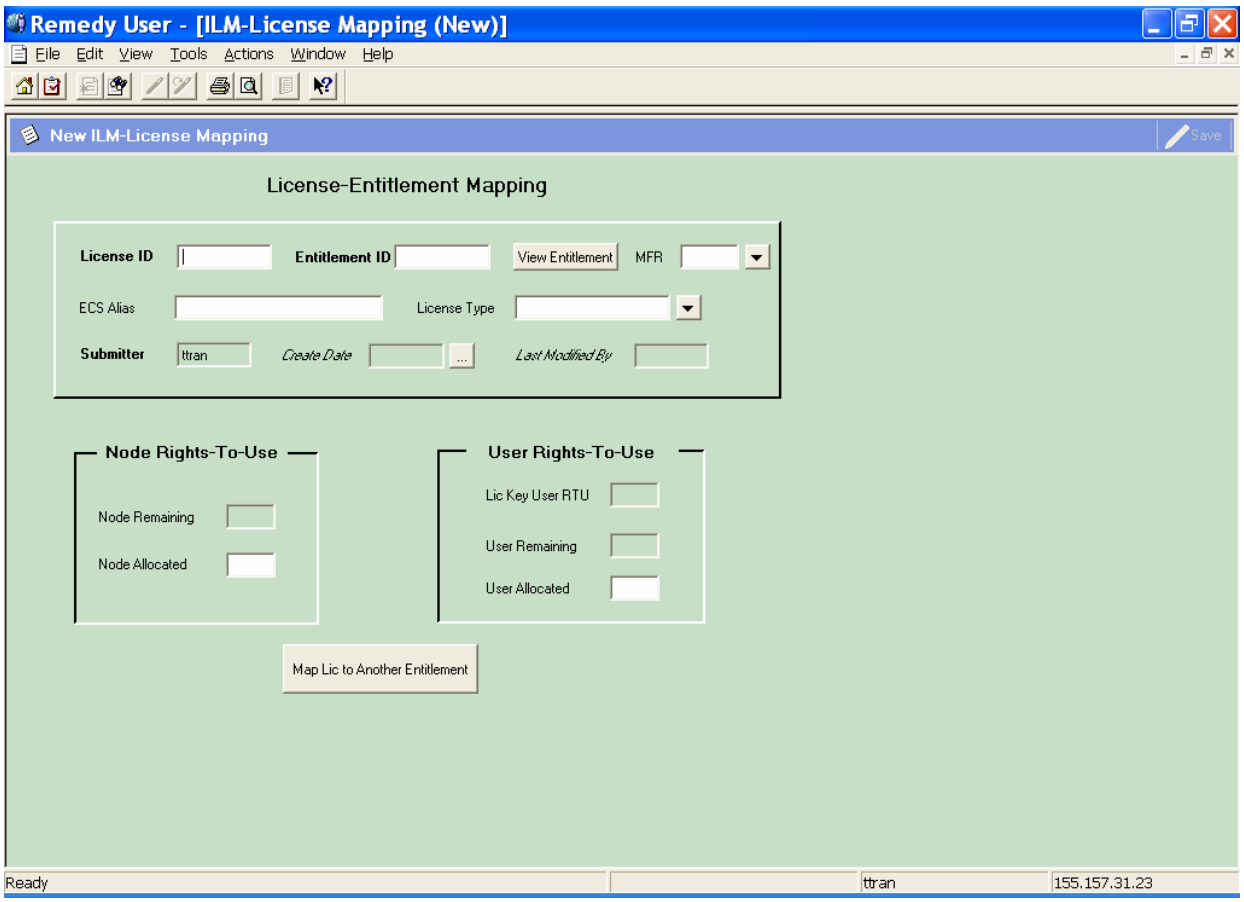


Figure 4.3.4-36. ILM-License Mapping GUI

Table 4.3.4-20 describes the fields on the License-Mapping form.

Table 4.3.4-20. ILM-License Mapping Form Fields Descriptions

Field Name	Data Type	Size	Entry	Description
License ID	Char	10	System Supplies	Unique designator for a license.
Entitlement ID	Char	10	required	Identifier for a purchased license entitlement.
MFR	Char	6	optional	Code for the manufacturer from whom the item was purchased.
ECS Alias	Char	40	system supplied	Common name used in ECS for the licensed product and all its versions and variants.
License Type	n/a	n/a	n/a	Type of license used.
Submitter	Char	30	system-supplied	The user that created the record.
Create Date	Date		system-supplied	Date the record was created.
Last Modified By	Char	30	system-supplied	The user who last modified the record.
Lic Key User Rtu	Numeric	8	system supplied	Number of users authorized by the license to run the licensed product concurrently on a single network. This value limits the user rights-to-use that can be recorded in the license's allocation records.
Node/User Remaining	Numeric	8	system supplied	Quantity of node or user rights under a license entitlement not yet consumed by the mapping of licenses to the entitlement.
Node/User Allocated	Numeric	8	optional	Number of node or user rights-to-use to be counted under the entitlement as having been consumed by the license. The value may not exceed the current value plus the rights remaining under the entitlement.

The following buttons are unique to this form:

- The "View Entitlement" button enables the operator to display the License Entitlement record that the license is being mapped to.
- The "Map Lic to Another Entitlement" button enables the operator to map the currently displayed License ID to another Entitlement record.

4.3.4.4.5 ILM-Additional Host GUI

The ILM-Additional Host form (Figure 4.3.4-37) is used for maintaining records about backup or redundant license servers for machines to which a license has been allocated. Identifying additional hosts has no effect on calculations of entitlements' node or user rights-to-use consumed or remaining, but is useful for tracking where licenses are supposed to be or may be installed.

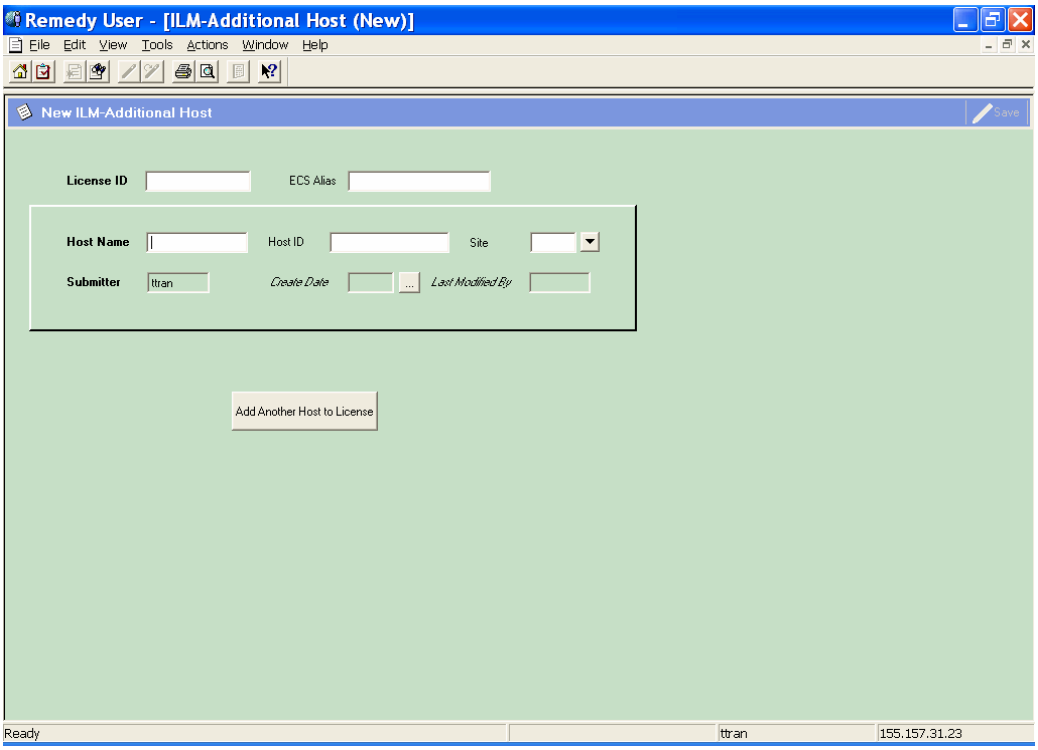


Figure 4.3.4-37. ILM-Additional Host GUI

Table 4.3.4-21 describes the fields on the ILM-Additional Host form.

Table 4.3.4-21. ILM-Additional Host Form Fields Descriptions

Field Name	Data Type	Size	Entry	Description
License ID	Char	10	System Supplied	Unique designator for a license. Derived from the displayed license.
ECS Alias	Char	30	System Supplied	Common name used in ECS for the licensed product and all its versions and variants.
Host Name	Char	30	optional	ECS name of a machine that is a backup or redundant license server for the one to which the license is principally allocated.
Host ID	Char	20	optional	Host id of a machine that is a backup or redundant license server for the one to which the license is principally allocated.
Site	Char	6	Optional	Code for the site to which the license is allocated.
Submitter	Char	30	system-supplied	The user whom created the record.
Create Date	Date	n/a	system-supplied	Date the record was created.
Last Modified By	Char	30	system-supplied	The last date the record was modified.

The "Add Another Host to License" Button enables the operator to allocated a license to more than one host. This is usually done to assign licenses to backup or redundant license servers

4.3.4.5 ILM-System Parameters

The ILM-System Parameters form (Figure 4.3.4-38) is for maintaining system-wide Remedy-ILM parameters and is principally used for initializing certain identifier fields.

Several fields have particular significance for ILM. The Site ID field contains the code for the ECS site where the operator's copy of Remedy is installed. This field is interrogated by ILM processes that have to determine which assets belong to the local site. The Next EIN ID field is used by Remedy to keep track of the most recently used, automatically-assigned EIN. Remedy increment the field whenever an operator creates a new EIN when creating records via ILM-EIN form.

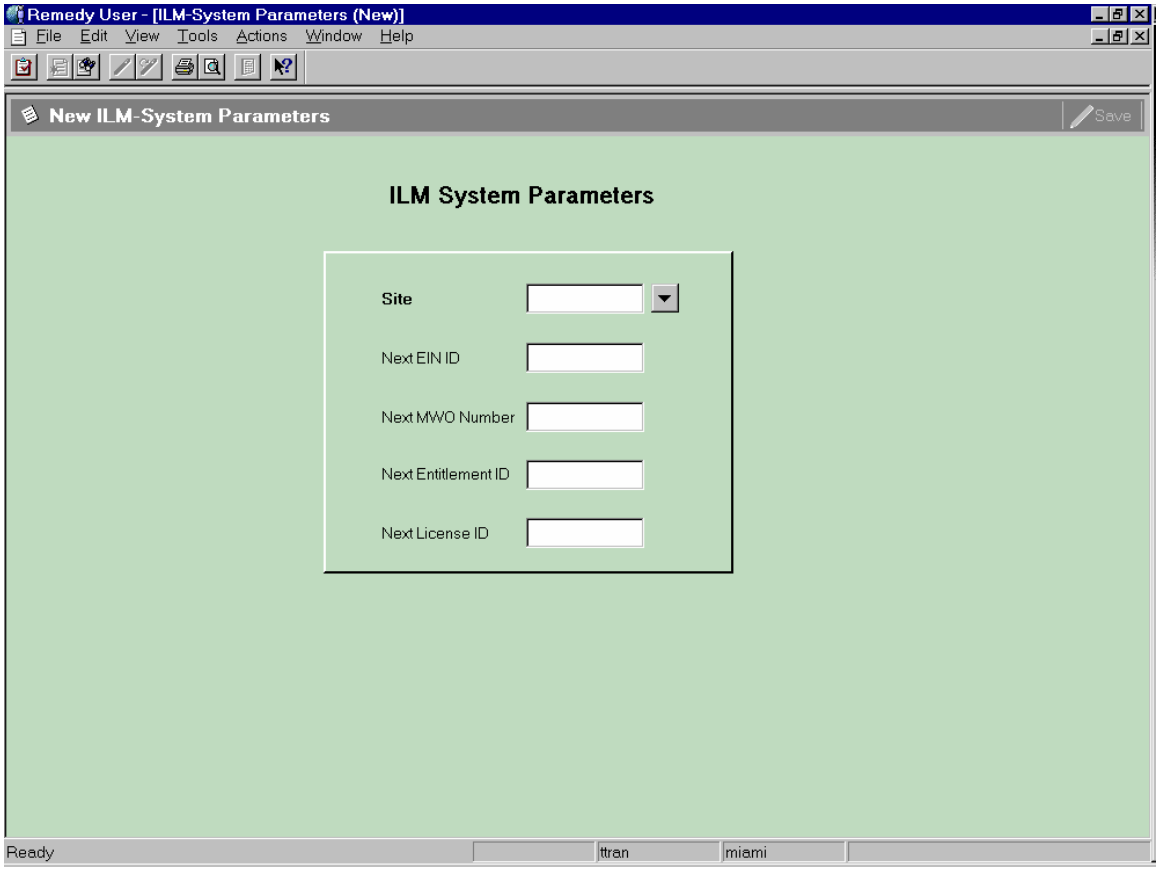


Figure 4.3.4-38. ILM-System Parameters GUI

Table 4.3.4-22 describes the fields on the ILM-System Parameters form.

Table 4.3.4-22. ILM-System Parameters Form Fields Descriptions

Field Name	Data Type	Size	Entry	Description
Site	Char	6	required	Code that identifies the ECS site where this Remedy system is installed.
Next EIN ID	Char	20	system-supplied, but modifiable	Field containing the next sequentially-available identifier when assigning EIN numbers automatically.
Next MWO Number	Char	10	system-supplied, but modifiable	Field containing the next MWO number to be used.
Next Entitlement ID	Char	10	system-supplied, but modifiable	Field containing the next entitlement id number to be used.
Next License ID	Char	10	system-supplied, but modifiable	Field containing the next license id number to be used.

4.3.4.6 User GUI

The User form, shown in Figure 4.3.4-39, is used by the administrator to add, modify or remove users of the Action Request (AR) System. The "User" form is used in conjunction with the "Group" form to provide users with permissions ultimately determining which operations individual users can perform and which forms and fields they can access. For more information on the "User" form and the AR System access control, refer to the Action Request System Server Administrator's Guide. Table 4.3.4-23 provides descriptions of the User Form.

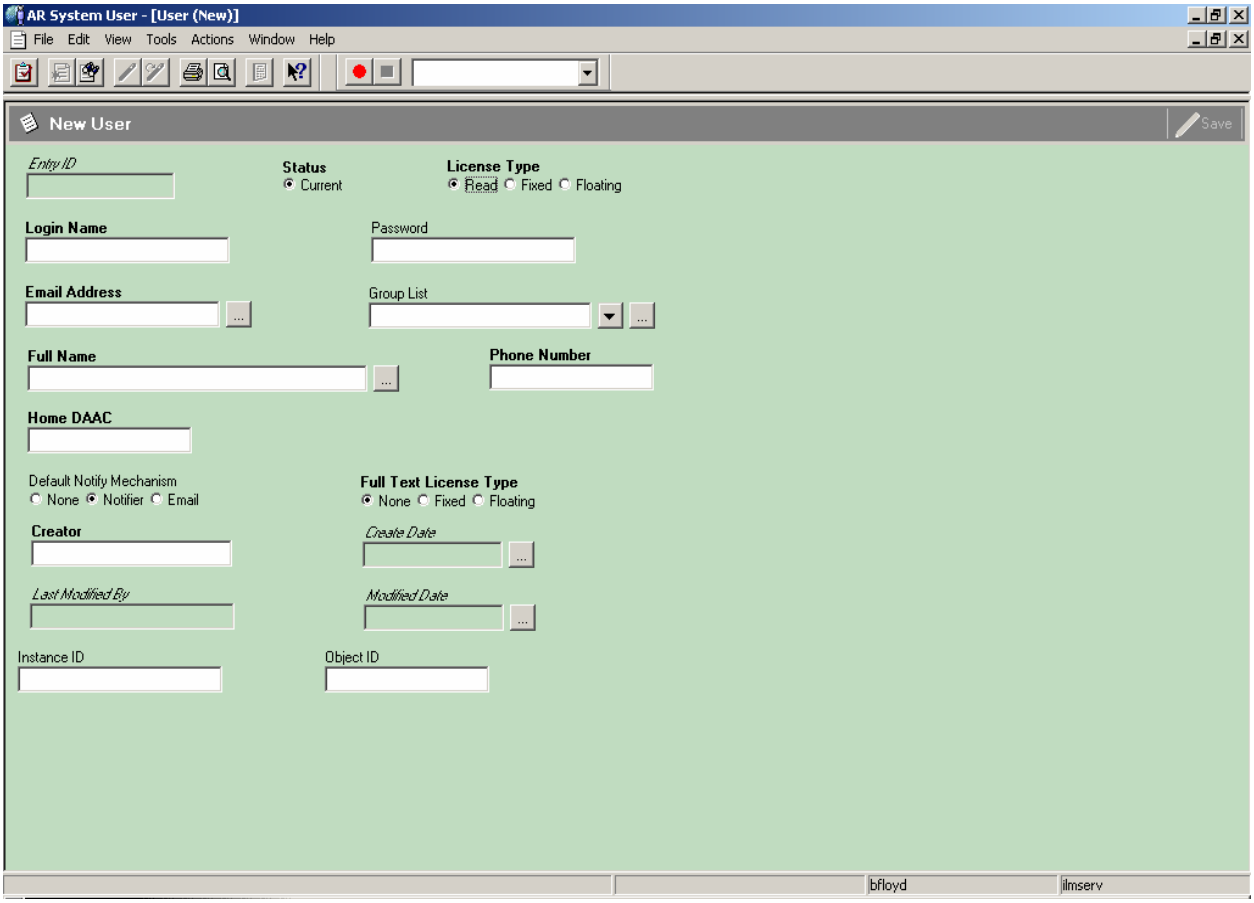


Figure 4.3.4-39. User GUI

Table 4.3.4-23. User Form Fields Descriptions

Field Name	Data Type	Size	Entry	Description
Entry-Id	Character	15	System generated	Entry ID of user
Status	Selection	*	Required	Is user current or not as shown by the "current" button.
License Type	Selection	*	Required	What type of license does this user have? (e.g., read, fixed, floating)
Login name	Character	30	Required	Login name of user
Password	Character	30	Optional	Password of User
Email Address	Character	255	Required	E-mail address of User
Group list	Character	255	Optional	Groups to which the user belongs
Full Name	Character	128	Required	Full Name of User
Phone Number	Character	55	Required	Phone Number of User
Home DAAC	Character	55	Required	Home DAAC of User
Default Notify Mechanism	Selection	*	Optional	Notification method (e.g., None, Notifier, and Email buttons.)
Full Text License Type	Selection	n/a	Required	The Full Text License capability is not available. So, the selection value should be "None."
Creator	Character	30	Required	Person who created the user account
Create-date	Date/Time	17	System generated	Date and time the entry was created at the present site (mm/dd/yy hh:mm:ss)
Last-modified-by	Character	30	System generated	User ID of person that last modified the user entry
Modified-date	Date/Time	17	System generated	Date and time of last modification to user entry (mm/dd/yy hh:mm:ss)
Instance ID	Character	38	Optional	A Remedy reserve field for Remedy's use only.
Object ID	Character	38	Optional	A Remedy reserver field for Remedy's use only.

Note: the size of a field with a "selection" data type can vary and the size is automatically adjusted to the size of the item selected from the selection list.

4.3.4.7 Remedy's Admin Tool GUI

The Remedy Administrator Tool is the tool one uses to create, modify, and delete Remedy objects (e.g. forms and menus). Figure 4.3.4-40 shows the main Administrator Tool GUI and its starting screen, the server window, and the workflow objects categories.

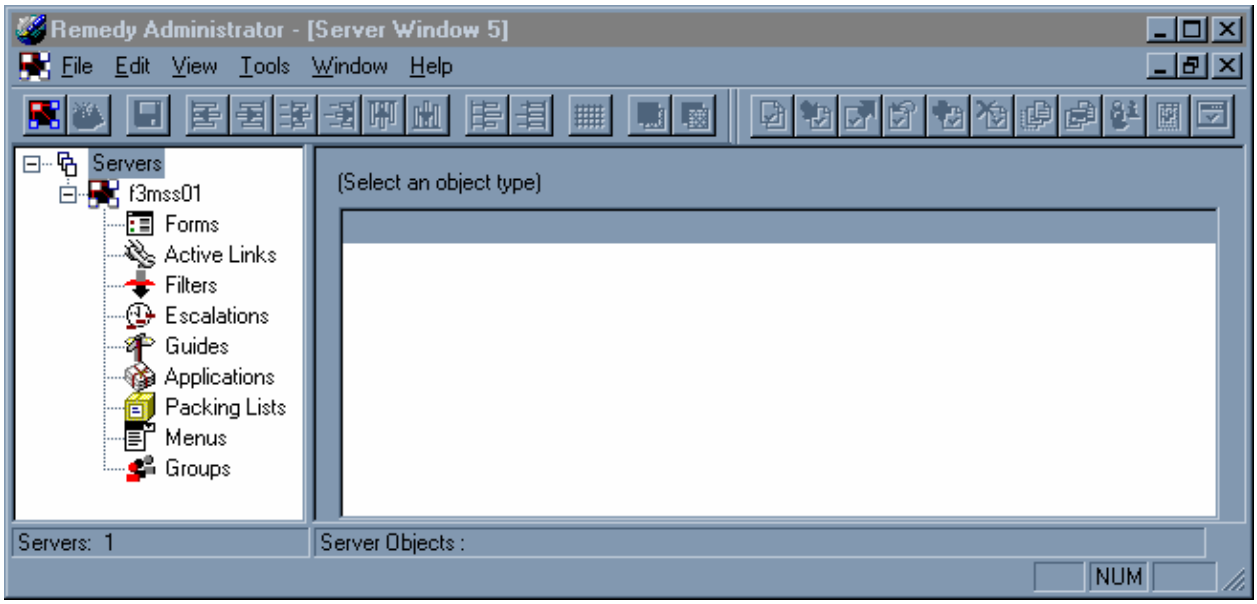


Figure 4.3.4-40. Admin Tool GUI

Table 4.3.4-24 provides a description of the Admin Tool GUI Workflow objects. For more information on these options, see *Remedy's Action Request System Administrator's Guide*, Vol. 1, Chapter 4, and/or the Remedy Administrator Tutorial using the Administrator Tool's Help menu.

Table 4.3.4-24. Admin Tool GUI, Workflow Object Descriptions

Workflow Object	Size	Entry	Description
Forms	Variable	System Generated	List of available forms.
Active links	Variable	System Generated	List of available active links.
Filters	Variable	System Generated	List of available filters.
Escalations	Variable	System Generated	List of available escalations.
Guides	Variable	System Generated	List of available guides.
Applications	Variable	System Generated	List of available applications
Packing lists	Variable	System Generated	List of available packing lists
Menus	Variable	System Generated	List of available menus
Groups	Variable	System Generated	List of available groups

4.3.4.8 Databases

Remedy's Action Request System uses the Sybase database called ARSystem that resides on the Remedy server machines. Tables and columns are created, modified, and deleted when forms are built and edited. This is all done automatically and is invisible to the user.

4.3.4.9 Special Constraints

Note that while ILM forms are open to all operators, and operators have view privileges to the user form, only system administrators have the ability to modify forms and tools presented in this section. Privileges are set according to DAAC policy.

4.3.4.10 Outputs

Output from Remedy's Action Request System (besides output to the screen in the form of its GUIs) is in the form of a report either to the printer or to a file (reports discussed in Section 4.3.4.16) or a log entry as shown in Table 4.3.4-25.

In the Remedy **aradmin** tool, you may enable and disable error logging at any time. Select File-> Server Information-> Log Files to display the current location of log files that have been enabled. The format of the messages is similar to the Unix syslog as seen in this example:

Table 4.3.4-25. Remedy Log File Messages Example

Mon Feb 23 16:28:16 1998 390600 : Failure during SQL operation to the database (ARERR 552)
Mon Feb 23 16:28:16 1998 Unable to connect: SQL Server is unavailable or does not exist. (Sybase 20009) : Connection refused
Mon Feb 23 16:28:16 1998 Unable to connect: SQL Server is unavailable or does not exist. (Sybase 20009) : Connection refused

4.3.4.11 Event and Error Messages

For Remedy's Action Request System's system messages see the *Action Request System Error Messages Guide*.

Table 4.3.4-26 lists non-system failure related messages that appear on the operator's screen.

Table 4.3.4-26. Non-System Failure Related Error Messages (1 of 6)

Error Message Char	Cause	Action
Inventory Management		
Parent EIN does not exist. Enter the correct Parent EIN.	Attempting to associate a component EIN to a Parent EIN that does not exist.	Enter the correct Parent EIN
Parent EIN, $Parent EIN$, is a component. Please enter the correct Parent EIN number.	Attempting to associate a component EIN to a Parent EIN that is a component to another EIN Structure	Enter the correct Parent EIN.
Parent EIN, $Parent EIN$, is not hardware. Enter the correct Parent EIN!	Attempting to associate a component EIN to a Parent EIN that is not hardware.	Enter the correct Parent EIN.
Part not found. Add new part into the part table or enter the correct part no.	Attempting to enter a part number that does not exist in the database.	Enter the correct Part No into the ILM-OEM Parts form or enter the correct part no.

Table 4.3.4-26. Non-System Failure Related Error Messages (2 of 6)

Error Message Char	Cause	Action
Part Number, $Part No$, already exists. Enter the correct Part Number!	Attempting to add a new Part No enter the ILM-Oem Parts form where the Part No already existed in the form.	Enter the correct Part number.
EIN is a component to Parent EIN. Update the Parent EIN's ECS name instead.	Attempting to update an ECS Name of a component EIN.	Update the Parent EIN's ECS Name.
New Parent EIN is the same as the old Parent EIN. Enter the correct new Parent EIN.	Attempting to relocate to relocate an item to the same Parent EIN.	Enter the correct New Parent EIN.
EIN already existed. Enter the correct EIN.	Attempting to create a new EIN that is already existed in the database.	Enter the correct EIN number.
A record for Location, $Location$, with Building, $Building$, already exists. Enter the correct Location and its associated Building!	Attempting to create a new location in the ILM-Inventory location form where the combination of location and building values already existed in the form.	Do not enter the new location and use the existed one.
EIN (EIN) is a Parent to EIN ($EIN is Parent$). Can not assign a Parent to another Parent structure.	Attempting to assign a Parent EIN as a component to an EIN structure.	Verify the Component EIN and the Parent EIN.
Audit Date ($Audit Date$) can not be greater than current date. Enter the correct audit date.	Attempting to update the audit date to a date greater than the current date.	Enter the correct audit date.
Receive Date ($Receive Date$) can not be greater than the current date ($DATE$). Enter the correct receive date.	Attempting to update the receive date to a date greater than the current date.	Enter the correct receive date.
Vendor ID, $Vendor ID$, already exists. Enter the correct Vendor ID!	Attempting to add a new vendor id that already existed in the ILM-Vendor-MFR form.	Use the existing Vendor ID if the vendor name is the same. If the vendor name is not the same, use another code to define the new vendor.
Site, $Site$, already exists. Enter the correct Site!	Attempting to add a site code that already existed in the ILM-Site form.	Use the existing site code.
Item Status, $Item Status$, already exists. Enter the correct Item Status!	Attempting to add a new item status that already existed in the ILM-Status Code form.	Enter the correct item status.
EIN Transactions		
Parent EIN field is a required field. Enter a Parent EIN value into the Parent EIN field.	Attempting to perform an EIN transacion where the Parent EIN value is not provided in the Parent EIN field.	Enter the correct Parent EIN value into the Parent EIN.

Table 4.3.4-26. Non-System Failure Related Error Messages (3 of 6)

Error Message Char	Cause	Action
Parent EIN ($Parent EIN$) does not exist. Enter the correct Parent EIN.	Attempting to perform an EIN transaction on the Parent EIN where the Parent EIN does not exist in the ILM-EIN form.	Enter the correct Parent EIN.
Parent EIN, $Parent EIN$ is a component of Parent EIN $Temp Parent Parent$. Perform transaction on the Parent EIN, $Temp Parent Parent$ instead.	Attempting to perform an EIN transaction on a component.	Enter the correct Parent EIN.
One or more of these fields is not completed (Archive (P)arent-(C)omponent and Archive Type. Enter values into both of these fields and execute the transaction again.	Attempting to perform an archive transaction where the Archive (P)arent-(C)omponent and/or Archive Type fields is not completed.	Complete both of these fields.
New Parent EIN is a component to Parent EIN ($Temp New Parent Parent$). Enter another New Parent EIN.	Attempting to relocate component(s) to a new Parent EIN where the new Parent EIN is a component to another EIN Structure.	Enter the correct new parent EIN.
New Parent EIN does not exist. Enter another New Parent EIN.	Attempting to relocate component(s) to a new parent EIN where the new parent EIN does not exist in the ILM-EIN form.	Enter the correct new parent EIN.
New Parent EIN ($New Parent EIN$) is not hardware. Enter another New Parent EIN value.	Attempting to relocate component(s) to a new parent EIN where the new parent EIN is something else other then hardware.	Enter the correct new parent EIN.
New Parent EIN ($New Parent EIN$) is the same as the old Parent EIN. Enter another new Parent EIN.	Attempting to relocate component(s) to a new parent EIN where the new parent EIN is the same as the old parent EIN	Enter the correct new parent EIN.
New Location values (New Location, New Building, or New Room) are not completed. Complete all the new locatioon values.	Attempting to perform a transaction where all the new location values are not completed.	Make sure all the new location values are completed.
Maintenance Work Order		
Parent EIN ($Parent EIN$) does not exist. Enter the correct Parent EIN.	Attempting to create a new maintenance work order where the Parent EIN does not exist in the ILM-EIN form.	Enter the correct Parent EIN.
EIN, $Parent EIN$, is not a parent. Enter the correct Parent EIN!	Attempting to create a new MWO where the parent EIN entered is a component of some EIN structure.	Enter the correct parent EIN.

Table 4.3.4-26. Non-System Failure Related Error Messages (4 of 6)

Error Message Char	Cause	Action
ALDT 1 End Date-Time ($ALDT End Date-Time$) can not be greater than current date.	Attempting to enter an ALDT End Date-Time that is greater than the current date and time.	Enter the correct ALDT End date-time.
Notification Date ($Notification Date-Time$) can not be greater than current date.	Attempting to enter a notificcation Date-Time that is greater than the current date and time.	Enter the correct notification date-time.
Vendor Complete Date-Time ($Vendor Complete Date-Time$) can not be greater than current date.	Attempting to enter an vendor complete Date-Time that is greater than the current date and time.	Enter the correct vendor complete date-time.
Vendor Call Date-Time ($Vendor Call Date-Time$) can not be greater than current date.	Attempting to enter an vendor call Date-Time that is greater than the current date and time.	Enter the correct vendor call date-time.
ALDT Start Date-Time ($ALDT Start Date-Time$) can not be greater than current date.	Attempting to enter an ALDT start Date-Time that is greater than the current date and time.	Enter the correct ALDT start date-time.
Failure Date ($Failure Date-Time$) can not be greater than current date.	Attempting to enter an failure Date-Time that is greater than the current date and time.	Enter the correct failure date-time.
Vendor Arrive Date-Time ($Vendor Arrive Date-Time$) can not be greater than current date.	Attempting to enter an vendor arrive Date-Time that is greater than the current date and time.	Enter the correct vendor arrive date-time.
Vendor Initial Response Date-Time ($Vendor Initial Resp Date-Time$) can not be greater than current date.	Attempting to enter an vendor initial response Date-Time that is greater than the current date and time.	Enter the correct vendor intial response date-time.
The MWO must already be created and you must have the MWO displayed in a Search/Modify window before clicking the Add Fail-Replacement Component Button!	Attempting to add a new work order line item where the work order information is blank.	Use the ILM-MWO form to find the appropriate work order and press the “Add Fail-Replacement Component” button to start adding line items to that work order.
Component EIN is the same as the MWO Parent EIN. Enter the correct component EIN.	Attempting to add a work order line item where the component EIN is the same as the MWO’s Parent EIN.	Enter the correct component EIN.
New Parent EIN is the same as the MWO's Parent EIN. Enter the correct New Parent EIN.	Attempting to add a work order line item to move a component to a new EIN structure where the new parent EIN is the same as the MWO’s Parent EIN.	Enter the correct new parent EIN value.
New Parent EIN ($New Parent EIN$) is a component to Parent EIN ($New Parent EIN Parent$). Enter the correct New Parent EIN value	Attempting to add a work order line item to move a component to a new EIN structure where the new parent EIN is the same as the MWO’s Parent EIN.	Enter the correct new parent EIN value.

Table 4.3.4-26. Non-System-Failure Related Error Messages (5 of 6)

Error Message Char	Cause	Action
New Parent EIN does not exist. Enter the correct New Parent EIN.	Attempting to add a work order line item to move a component to a new EIN structure where the new parent EIN does not exist in the ILM-EIN form.	Enter the correct new parent EIN value.
New Parent EIN is not hardware. Enter the correct New Parent EIN value.	Attempting to add a work order line item to move a component to a new EIN structure where the new parent EIN in not hardware.	Enter the correct new parent EIN value.
Component EIN is a parent. Enter the correct Component EIN value.	Attempting to add a work order line item where the component EIN is a parent.	Enter the correct component EIN value.
Line Item does not have the correct event type and maint code. Enter the correct event type and maint code.	Entering the incorrect combination of event type and maint code in the ILM-MWO Line Item form.	Enter the correct event type and maint code.
License Management		
Entitlement Part No does not exist. Enter the correct part number or add the new part into the ILM-License Entitlement Part form.	Attempting to associate entitlement with an Entitlement Part no that does not exist in the ILM-License Entitlement Form.	Enter the correct part number or add the new part into the ILM-License Entitlement Part form.
Contract ID, $Contract ID$, already exists. Enter the correct Contract ID!	Attempting to associate a license entitlement with a contract ID where the contract id does not exist in the ILM-Maint contract form.	Enter the correct contract ID.
Entitlement ID does not exist. Enter the correct Entitlement ID.	Attempting to map a license to a purchased entitlement that does not exist in the ILM-Entitlement form.	Enter the correct Entitlement ID.
Node allocated is greater than Node remaining. Reduce number of Right-To-Use or enter another Entitlement ID.	Attempting to map a license to an entitlement where the entitlement node remaining is less than the amount allocating.	Reduce the number of node allocated.
User Allocated is greater than License Key User RTU allocated to the license. Enter the correct User Allocated value.	Attempting to map a license to an entitlement where the user allocated is greater than the license key user rights-to-use.	Reduce the user allocated to equal to or less than the license key RTU.
User Allocated is greater than User RTU Remaining. Lower User Allocated or Enter another Entitlement ID.	Attempting to map a license to an entitlement where the user allocated is greater than the entitlement user rights-to-use remaining	Reduce the user allocated.
This license right-to-use had already been mapped to entitlement $Ent ID Holder$.	Attempting to map a node lock license to more than one entitlements.	Do not map the license to another entitlement.

Table 4.3.4-26. Non-System-Failure Related Error Messages (6 of 6)

Error Message Char	Cause	Action
Total user allocated ($Total User Allocated$) is greater than the lic key user RTU. Reduce number of User Allocated	Attempting to map a license to entitlements where the total user allocated is greater than the license key user rights-to-use.	Reduce the user allocated to equal to or less than the license key RTU.
Node allocated or User allocated has not been assigned to this Entitlement ID ($Entitlement ID$).	Attempting to map a license to an entitlement where the user did not enter any value in the Node or user allocated.	Enter node or user allocated to map against the entitlement.
Node Allocated can not be greater than one for nodelock licenses. Enter 1 to allocate 1 Right-To-Use for this Nodelock license.	Attempting to allocate more than 1 node rights-to-use for a node lock license.	reduce the number of node rtu allocated to 1.
Combination of Entitlement Part No-MFR and Version $Temp PN_MFR_Ver$ already existed. Enter the correct Entitlement Part No.	Attempting to add a new entitlement part into the ILM-License Products form where the combination of the Entitlement Part No, MFR, and version already existed in the database.	use the existing entitlement part information.

4.3.4.12 Reports

Operator may generate ad-hoc reports from any forms (see AR System 4.x User manual on Reporting). However, ILM provides a set of predefined reports that operator can generate through Tools→Report from the Menu bar. Table 4.3.4-27 identifies the predefined reports available in ILM. The figures that follow (Figures 4.3.4-41 through 4.3.4-57) present a sample of each.

Table 4.3.4-27. ILM Reports (1 of 2)

Report Type	Report Description
Inventory Management	
Install/Receipt Report	A report that describes an operator-specified EIN item together with all of its associated components order by EIN number. See Figure 4.3.4-42.
Installation Report	A report that describes an operator-specified EIN item together with its components having status "I" (for installed). See Figure 4.3.4-43.
Parent EIN Report	Provides a listing of only Parent items. See Figure 4.3.4-44.
Parent EIN and total System Cost Report	Provides a listing of only Parent items and the total system cost for each Parent. See Figure 4.3.4-45.
Inventory Report	Provides an ASCII formatted report identifying the inventory items by Parent EIN according to the operator-specified criteria. See Figure 4.3.4-46.
ECS Shipping Report	Provides a listing of items that were shipped within an operator-specified time frame. See Figure 4.3.4-47.
Quarterly Property Management Report	Provides a list of contractor-acquired equipment items by quarter, sorted by Mfr and product description. See Figure 4.3.4-48.

Table 4.3.4-27. ILM Reports (2 of 2)

Report Type	Report Description
Purchase Order Cost Report	Provides a list of EINs and their cost associated with an operator-specified purchase order. See Figure 4.3.4-49.
Cost - Selected ECS Managed Property	Provides the quantity and total cost of operator-selected EINs, grouped by type of inventory (Hardware, Software, Consumable, i.e.). See Figure 4.3.4-50.
EIN Transaction History	A list of the transactions processed for operator-specified items during an operator-specified timeframe, sorted by EIN number and "from" location. See Figure 4.3.4-51.
Spare Equipment Report	Provides a list of spare equipment for a selected site or system-wide report. See Figure 4.3.4-52.
Maintenance Management	
Maintenance Work Order Verification Report	A full description of operator-selected work orders and the items undergoing maintenance action that they cover. See Figure 4.3.4-53.
Maintenance Contract Report	Provides a list of operator-specified maintenance contract and all the associated items the contract covers. See Figure 4.3.4-54.
RMA Work Order Report	Provides an ASCII formatted spreadsheet formatted report with embedded formulas for RMA data. See Figure 4.3.4-55.
License Management	
License Entitlements Status Report	Lists the status of current license entitlements for licensed software products, sorted by software product, version, and license type. See Figure 4.3.4-56.
License Allocations by Product Report	Lists license allocations for licensed software products, sorted by product, version, and host name. See Figure 4.3.4-57.
License Allocations by Host Report	Lists license allocations, sorted by host name and ECS part alias. See Figure 4.3.4-58.

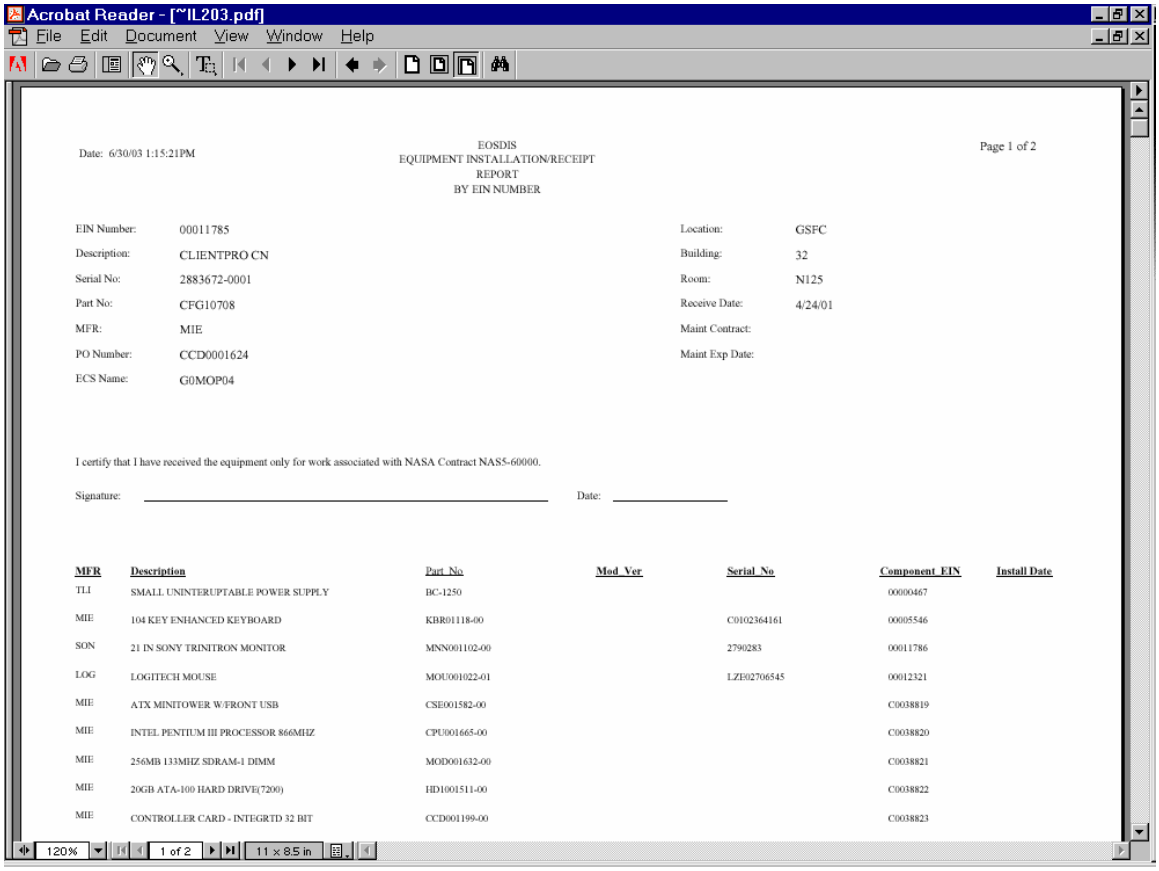


Figure 4.3.4-41. Install/Receipt Report

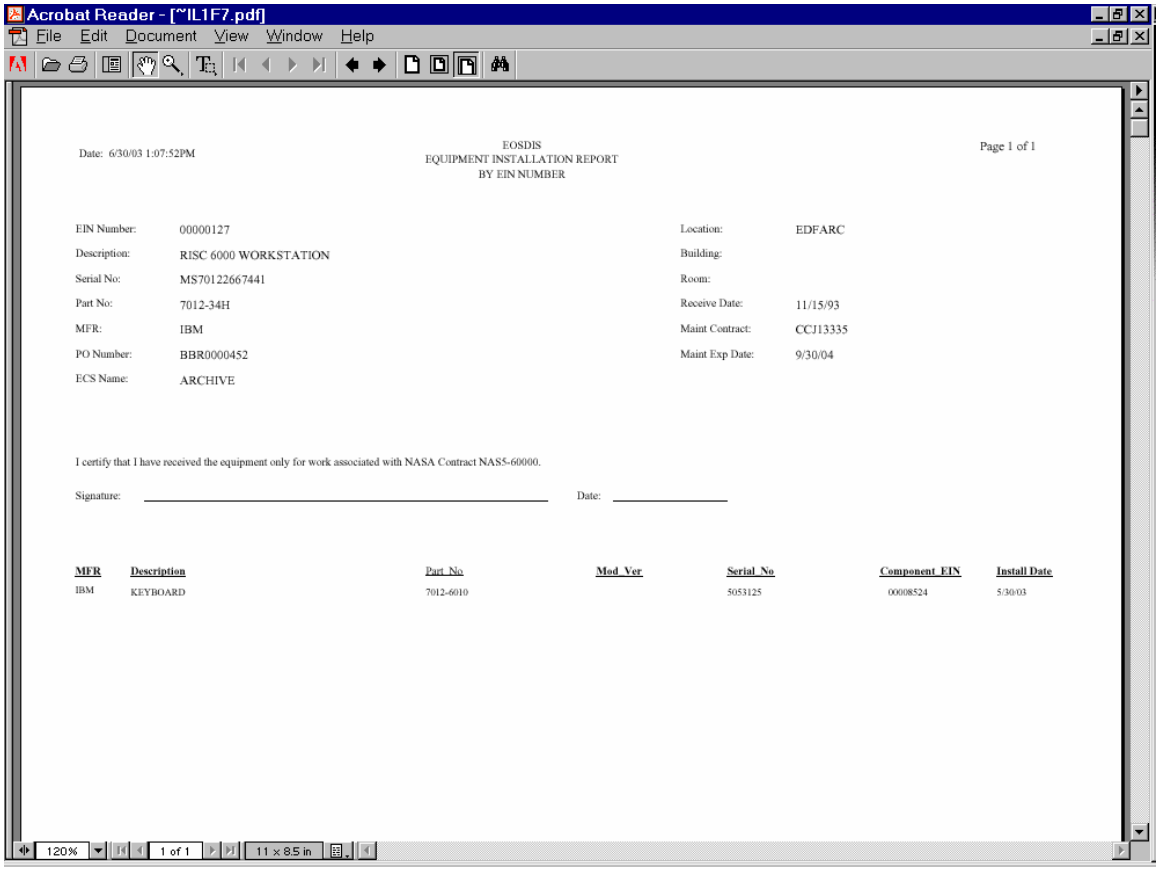


Figure 4.3.4-42. Installation Report

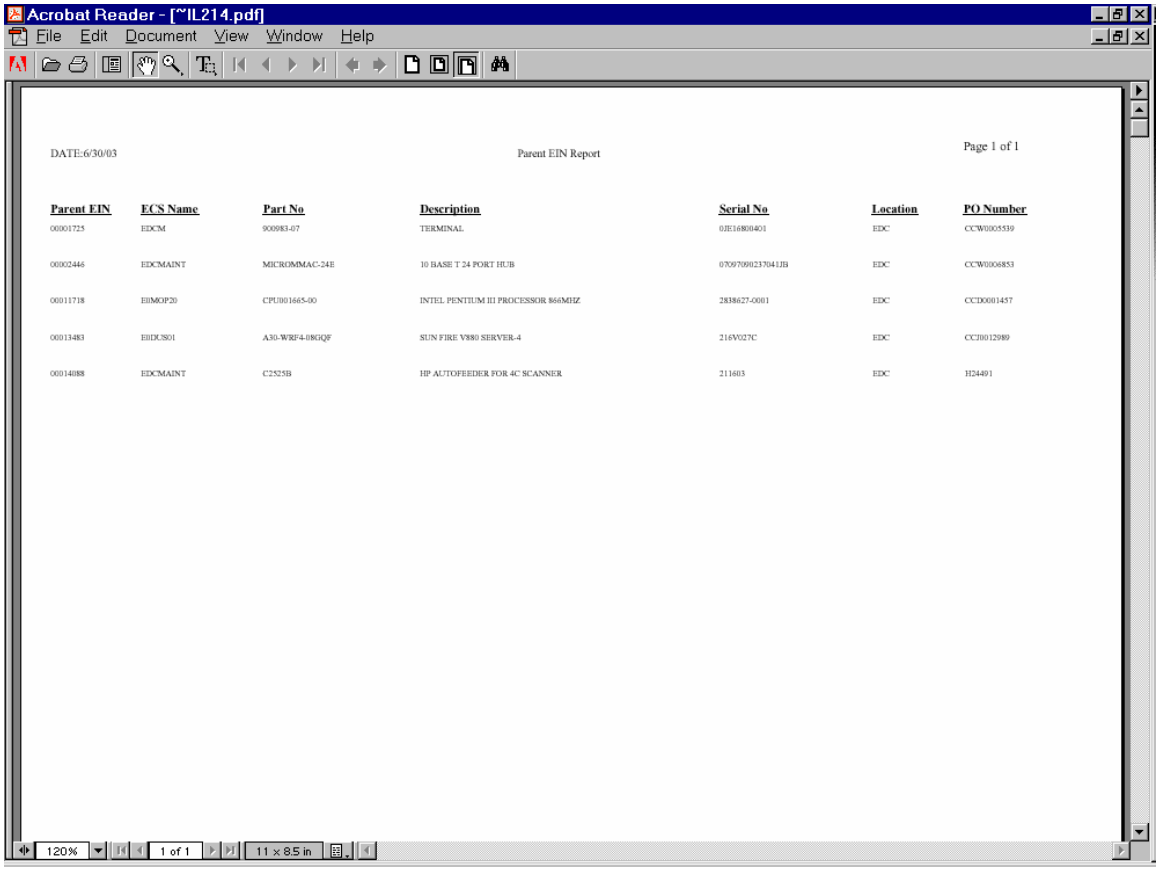


Figure 4.3.4-43. Parent EIN Report

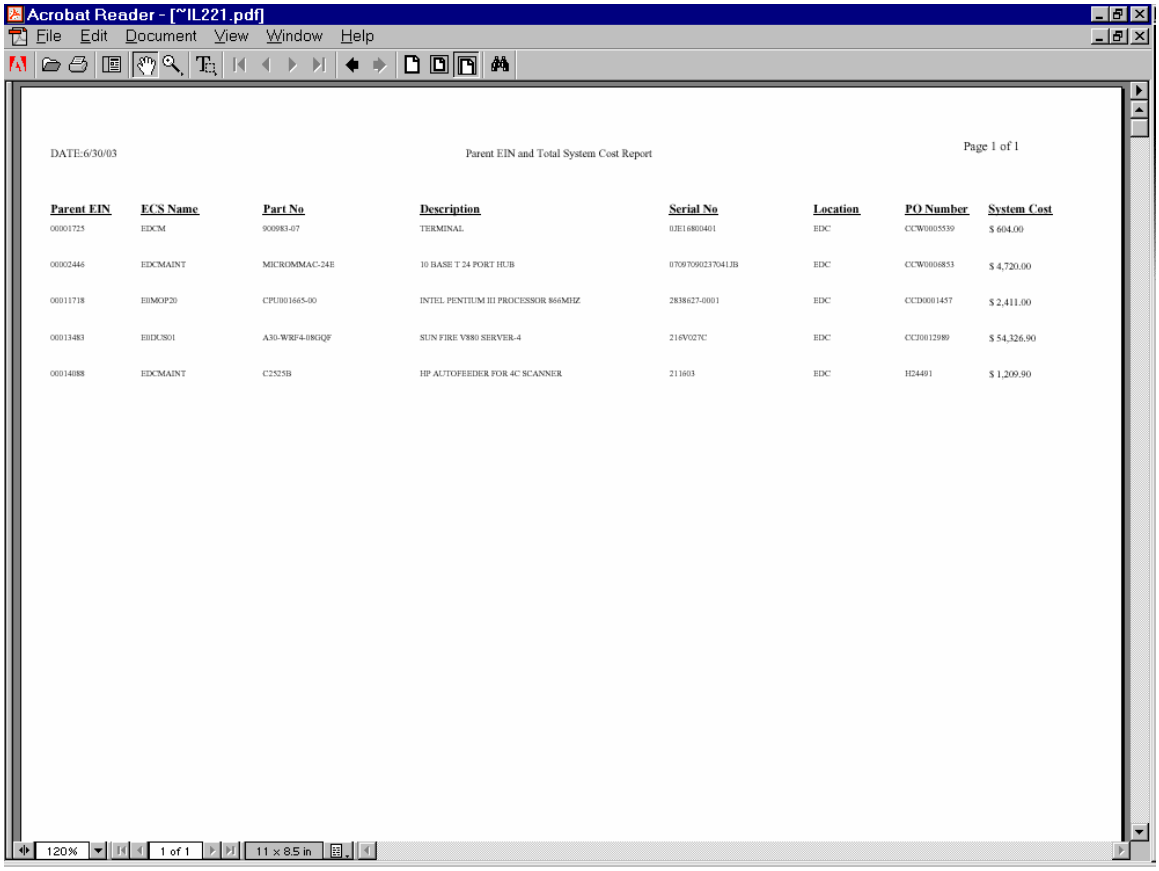


Figure 4.3.4-44. Parent EIN and Total System Cost Report

Parent EIN	Part EIN	Mfr	ECS Name	Audit Date	Stat	Part Num	Serial Num	Unit Cost	Product Description	Location	Bldg	Room	Code	PO Num	Date Rec'd	Vendor
00001838	00001838	SUN	n0dms04	2/6/02	I	A12-UBA1-1E-064AB	645F0AA4	$8,797.00	Ultra 1 System	NSIDC	NSIDC	209	H	CCW0005354	12/2/96	SUN
00001838	00001891	SUN	n0dms04	2/6/02	I	X5203A	645G0830	$1,035.00	UniPak - 4.2 GB 5400 RPM FW SCSI-2	NSIDC	NSIDC	209	H	CCW0005354	12/18/96	SUN
00001838	00003491	SUN	n0dms04	2/6/02	I	X267A	9843KN4545	$5,000.00	Color Monitor - 20 IN	NSIDC	NSIDC	209	H	CCW0005354	12/2/96	SUN
00001838	00006793	SUN	n0dms04	2/6/02	I	NE SUN1	LZB64001097	$0.00	Mouse - 3 Button Track Ball	NSIDC	NSIDC	209	H	CCW0005354	12/2/96	SUN
00001838	00006794	SUN	n0dms04	2/6/02	I	320-1233-02	9626371319	$0.00	Keyboard	NSIDC	NSIDC	209	H	CCW0005354	12/2/96	SUN
00001838	C0009132	SUN	n0dms04	2/6/02	I	X1025A	12603	$1,500.00	FDDI SINGLE ATTACH SBUS CARD	NSIDC	NSIDC	209	H	CCW0005354	12/2/96	SUN
00001838	C0009133	SUN	n0dms04	2/6/02	I	X132P	501282278476877	$0.00	Memory - 32MB RAM Expansion (1x32	NSIDC	NSIDC	209	H	CCW0005354	12/2/96	SUN
00001838	C0009134	SUN	n0dms04	2/6/02	I	X132P	501262278476942	$0.00	Memory - 32MB RAM Expansion (1x32	NSIDC	NSIDC	209	H	CCW0005354	12/2/96	SUN
00001838	C0009135	SUN	n0dms04	2/6/02	I	X3500A		$0.00	Country Kit	NSIDC	NSIDC	209	H	CCW0005354	12/2/96	SUN
00001838	C0009136	SUN	n0dms04	2/6/02	I	X6001A	9625201083	$90.00	Floppy Drive - 3.5 IN Disk Drive-1	NSIDC	NSIDC	209	H	CCW0005354	12/2/96	SUN
00001838	C0009137	SUN	n0dms04	2/6/02	I	X6153A	9647723061	$240.00	CD ROM - Internal SUNCD 4	NSIDC	NSIDC	209	H	CCW0005354	12/2/96	SUN
00001838	C0009839	SUN	n0dms04	2/6/02	I	370-2286-01	9643604099	$0.00	Hard Drive - Internal for X5204A	NSIDC	NSIDC	209	H	CCW0005354	12/18/96	SUN
00001838	C0045377	SUN	n0dms04	6/25/02	I	X5237A	0145KP6EMS	$479.20	ULTRA SCSI DISK DRIVE, 18GB INTERN	NSIDC	NSIDC	209	H	CCD0002848	11/27/01	SUN
00001838	C0149507	SUN	n0dms04	1/27/99	I	SOLD-C		$45.00	Solaris Media for Servers	NSIDC	NSIDC	209	S	CCW0005354	12/2/96	SUN
00001839	00001839	SUN	n0mos20	2/6/02	I	A12-UBA1-1E-064AB	645F0B2C	$8,797.00	Ultra 1 System	NSIDC	NSIDC	252	H	CCW0005354	12/2/96	SUN
00001839	00001890	SUN	n0mos20	2/6/02	I	X5203A	645G0868	$1,035.00	UniPak - 4.2 GB 5400 RPM FW SCSI-2	NSIDC	NSIDC	252	H	CCW0005354	12/18/96	SUN
00001839	00003494	SUN	n0mos20	2/6/02	I	X267A	9647GI3704	$5,000.00	Color Monitor - 20 IN	NSIDC	NSIDC	252	H	CCW0005354	4/3/00	SUN
00001839	00006771	SUN	n0mos20	2/6/02	I	320-1233-02	9626371388	$0.00	Keyboard	NSIDC	NSIDC	252	H	CCW0005354	12/2/96	SUN
00001839	00006772	SUN	n0mos20	2/6/02	I	NE SUN1	LZB64001084	$0.00	Mouse - 3 Button Track Ball	NSIDC	NSIDC	252	H	CCW0005354	12/2/96	SUN
00001839	C0009138	SUN	n0mos20	2/6/02	I	370-2040-03	9643547711	$0.00	Hard Drive - 2.1 GB Internal	NSIDC	NSIDC	252	H	CCW0005354	12/2/96	SUN
00001839	C0009139	SUN	n0mos20	2/6/02	I	X1025A	11748	$1,500.00	FDDI SINGLE ATTACH SBUS CARD	NSIDC	NSIDC	252	H	CCW0005354	12/2/96	SUN
00001839	C0009140	SUN	n0mos20	2/6/02	I	X132P	501262279495644	$0.00	Memory - 32MB RAM Expansion (1x32	NSIDC	NSIDC	252	H	CCW0005354	12/2/96	SUN
00001839	C0009141	SUN	n0mos20	2/6/02	I	X132P	501262279495714	$0.00	Memory - 32MB RAM Expansion (1x32	NSIDC	NSIDC	252	H	CCW0005354	12/2/96	SUN
00001839	C0009142	SUN	n0mos20	2/6/02	I	X3500A		$0.00	Country Kit	NSIDC	NSIDC	252	H	CCW0005354	12/2/96	SUN
00001839	C0009143	SUN	n0mos20	2/6/02	I	X6001A	9625201087	$90.00	Floppy Drive - 3.5 IN Disk Drive-1	NSIDC	NSIDC	252	H	CCW0005354	12/2/96	SUN
00001839	C0009144	SUN	n0mos20	2/6/02	I	X6153A	6Y50C01029	$240.00	CD ROM - Internal SUNCD 4	NSIDC	NSIDC	252	H	CCW0005354	12/2/96	SUN
00001839	C0009838	SUN	n0mos20	2/6/02	I	370-2286-01	9643604145	$0.00	Hard Drive - Internal for X5204A	NSIDC	NSIDC	252	H	CCW0005354	12/18/96	SUN
00001839	C0038808	SUN	n0mos20	2/6/02	I	501-2961	017403	$0.00	System Board	NSIDC	NSIDC	252	H	CCW0005354	4/16/01	SUN
00001839	C0149508	SUN	n0mos20	1/27/99	I	SOLD-C		$45.00	Solaris Media for Servers	NSIDC	NSIDC	252	S	CCW0005354	12/2/96	SUN

Figure 4.3.4-45. Inventory Report

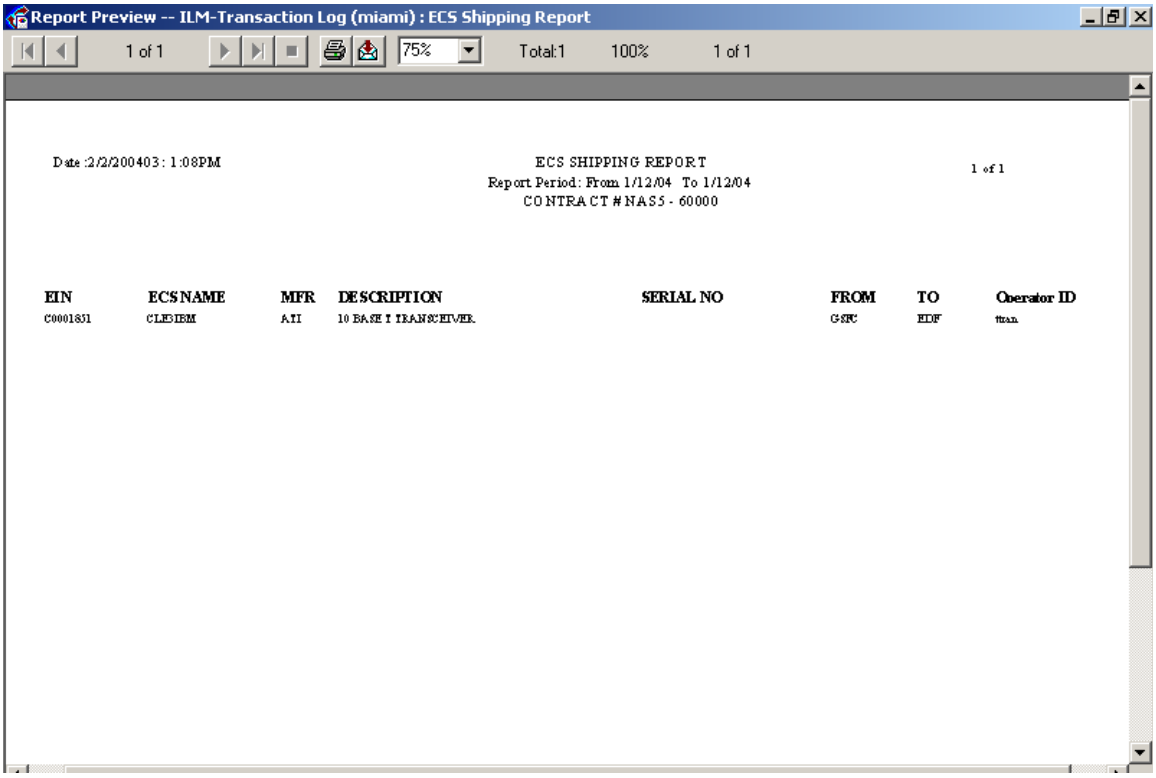


Figure 4.3.4-46. ECS Shipping Report

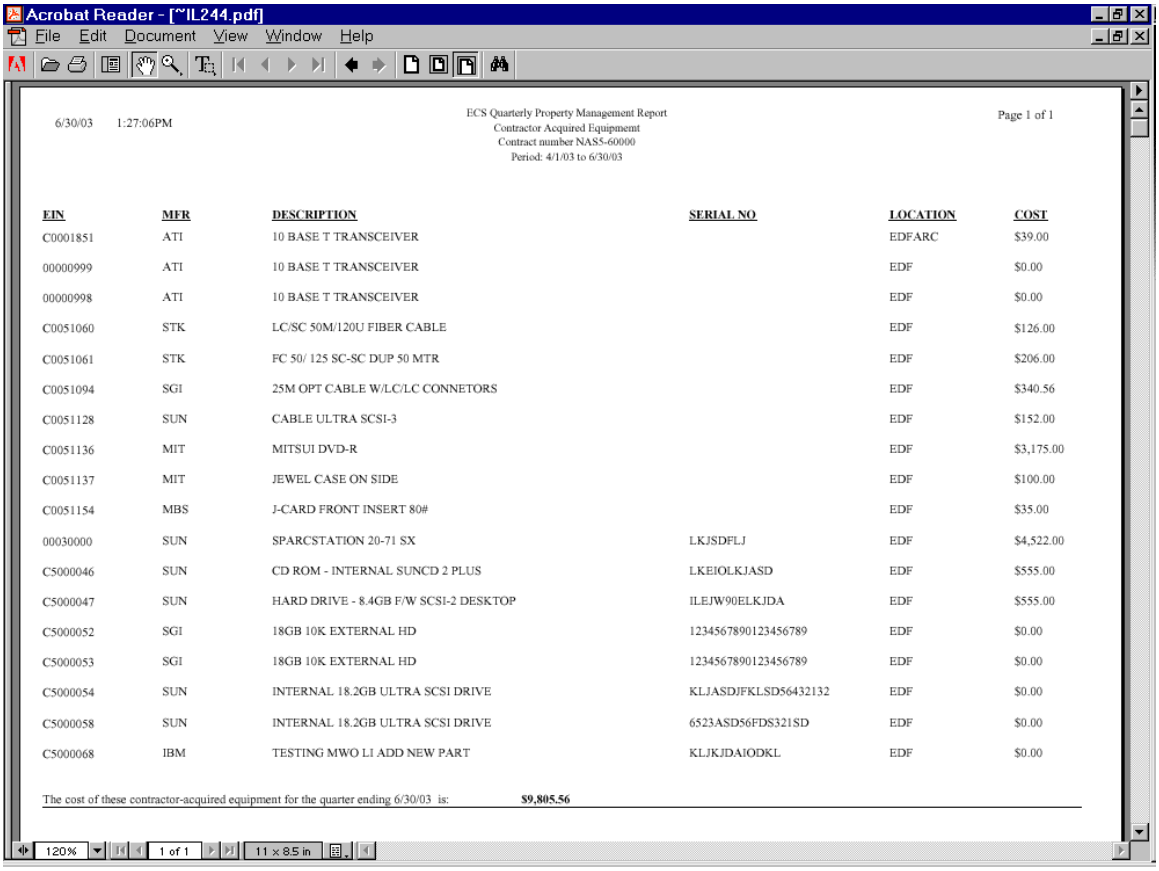


Figure 4.3.4-47. Quarterly Property Management Report

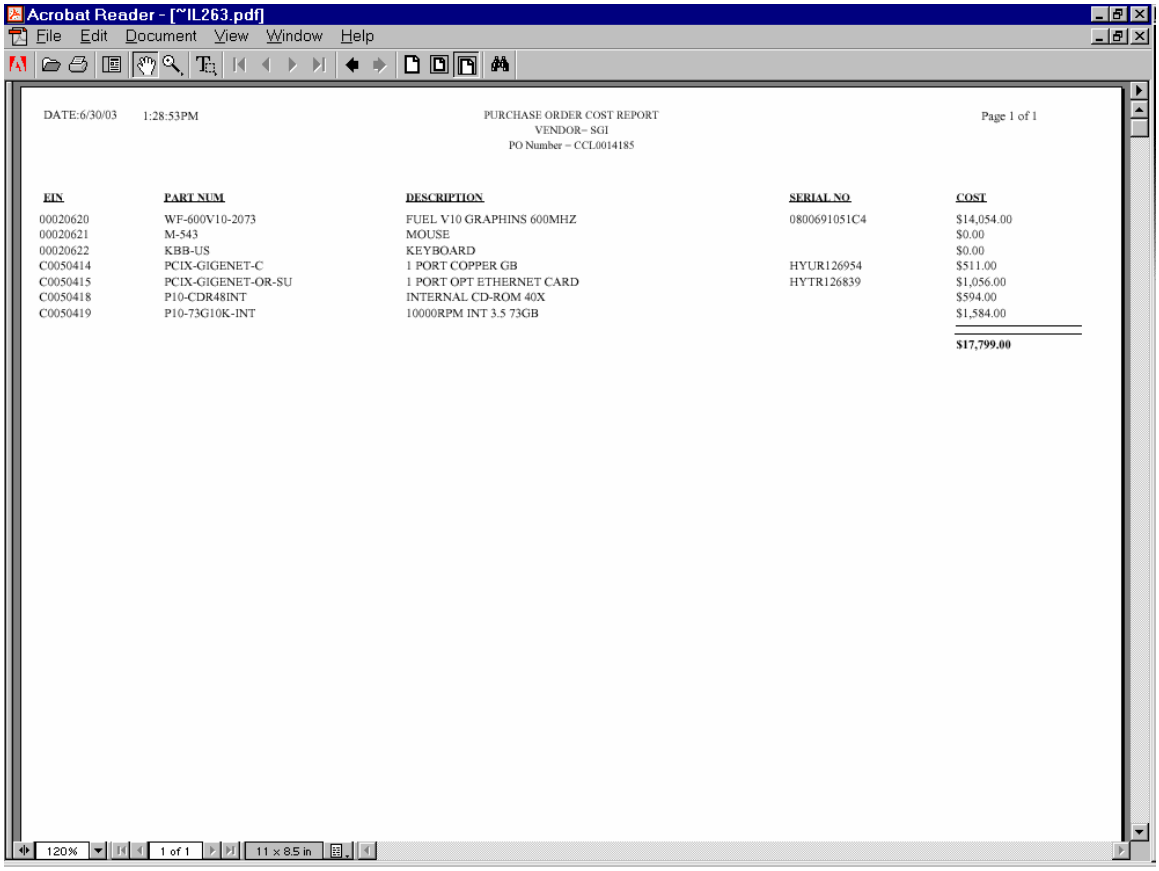


Figure 4.3.4-48. Purchase Order Cost Report

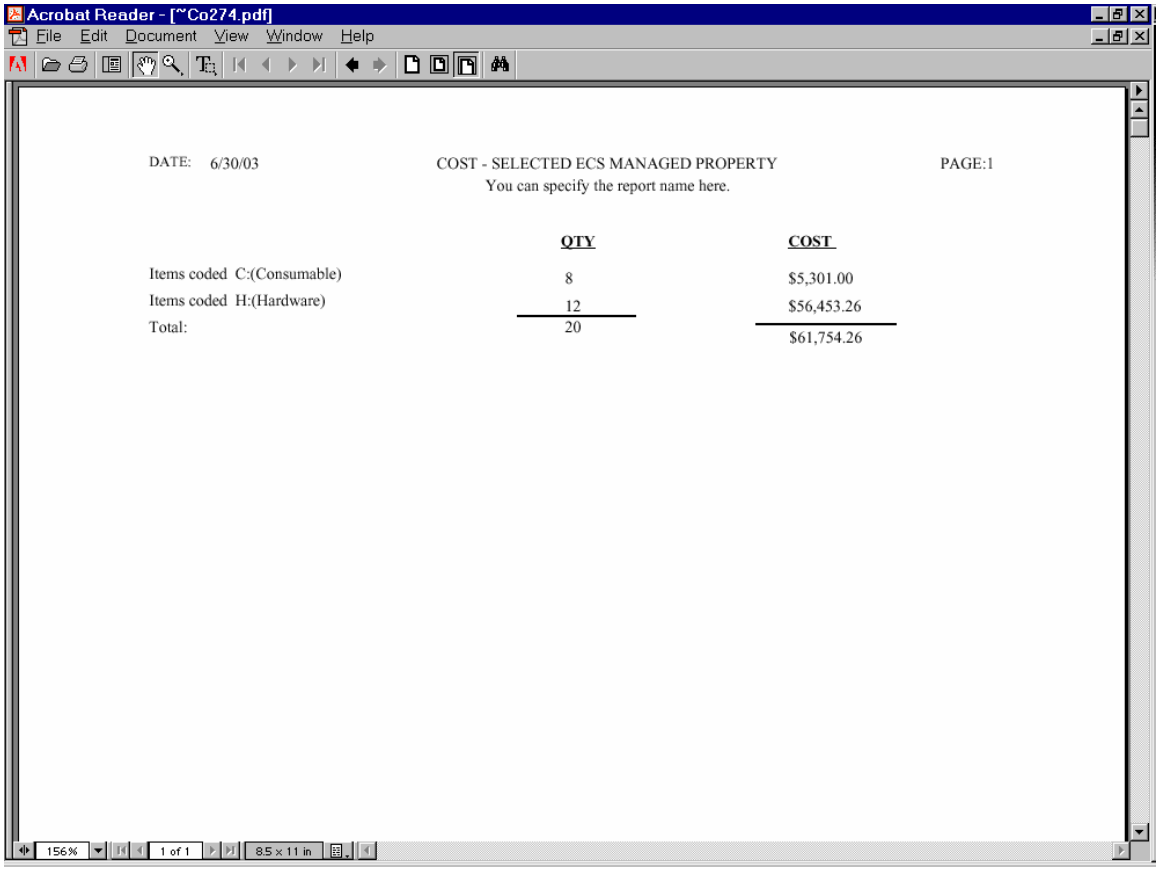


Figure 4.3.4-49. Cost - Select ECS Managed Property Report

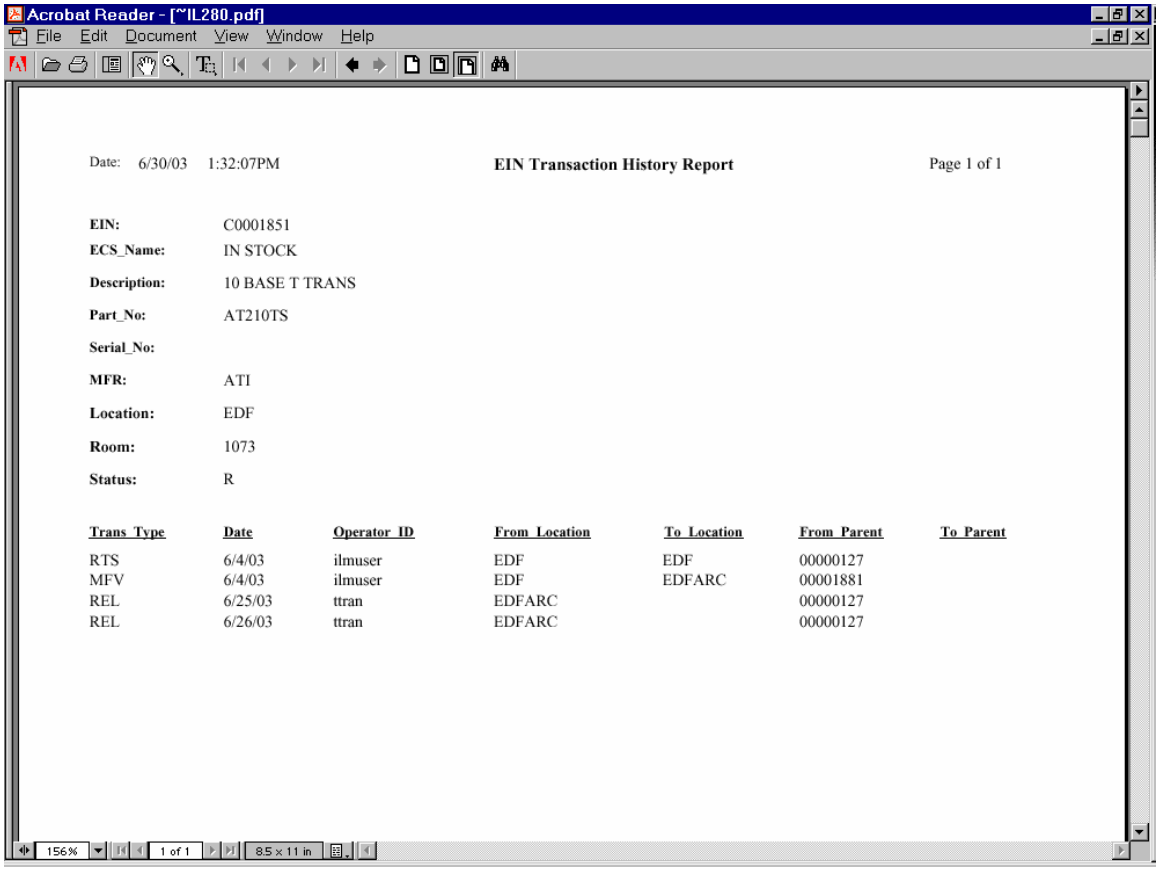


Figure 4.3.4-50. EIN Transaction History Report

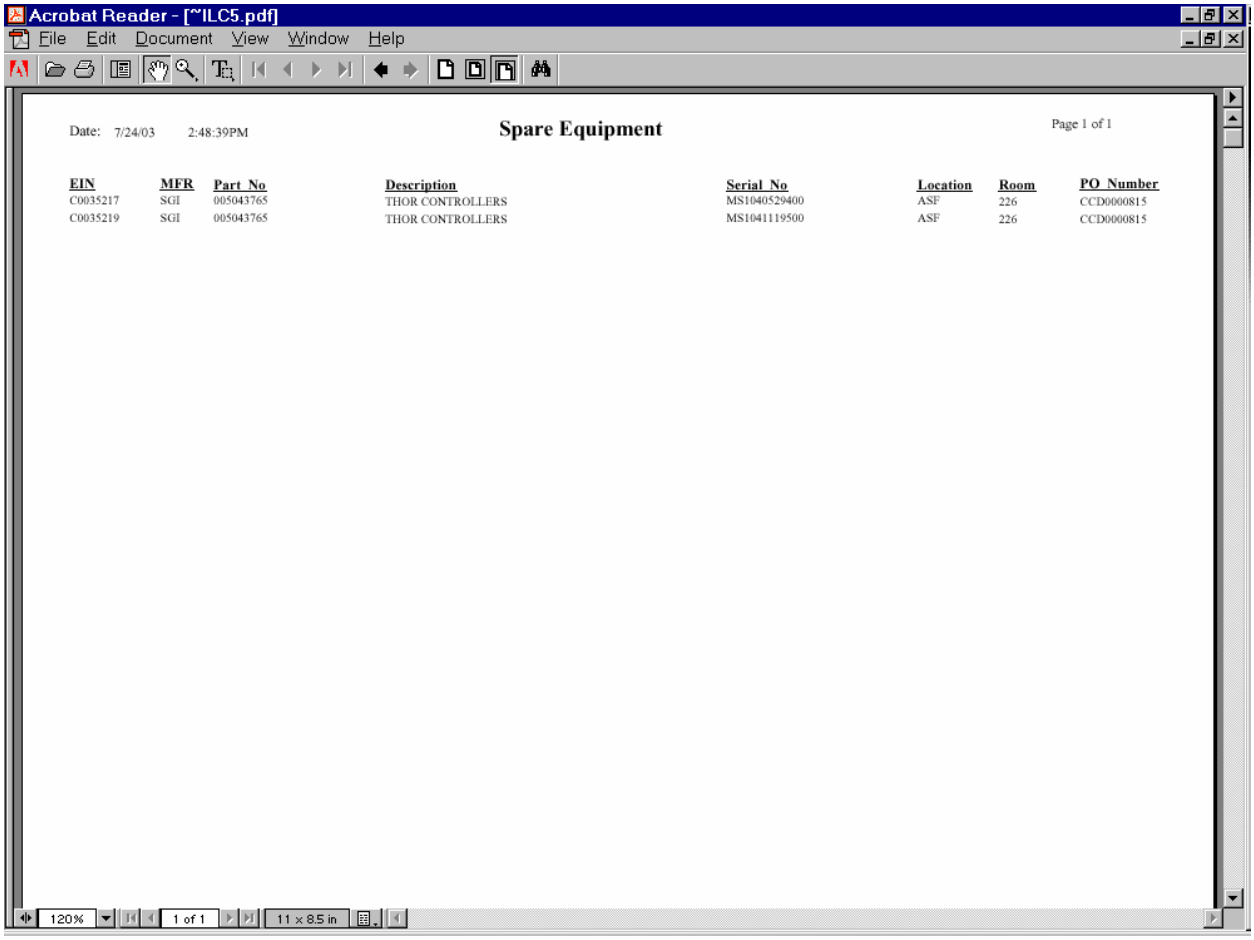


Figure 4.3.4-51. Spare Equipment Report

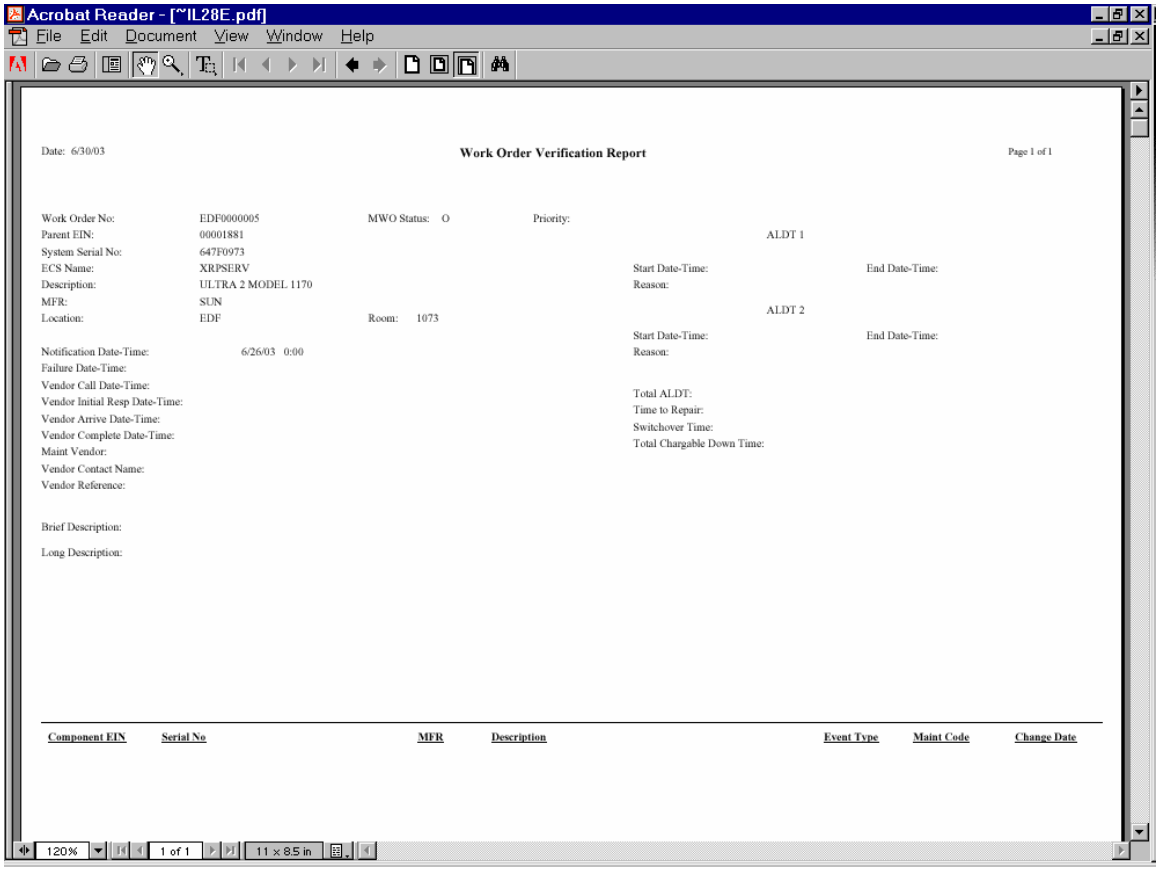


Figure 4.3.4-52. Maintenance Work Order Verification Report

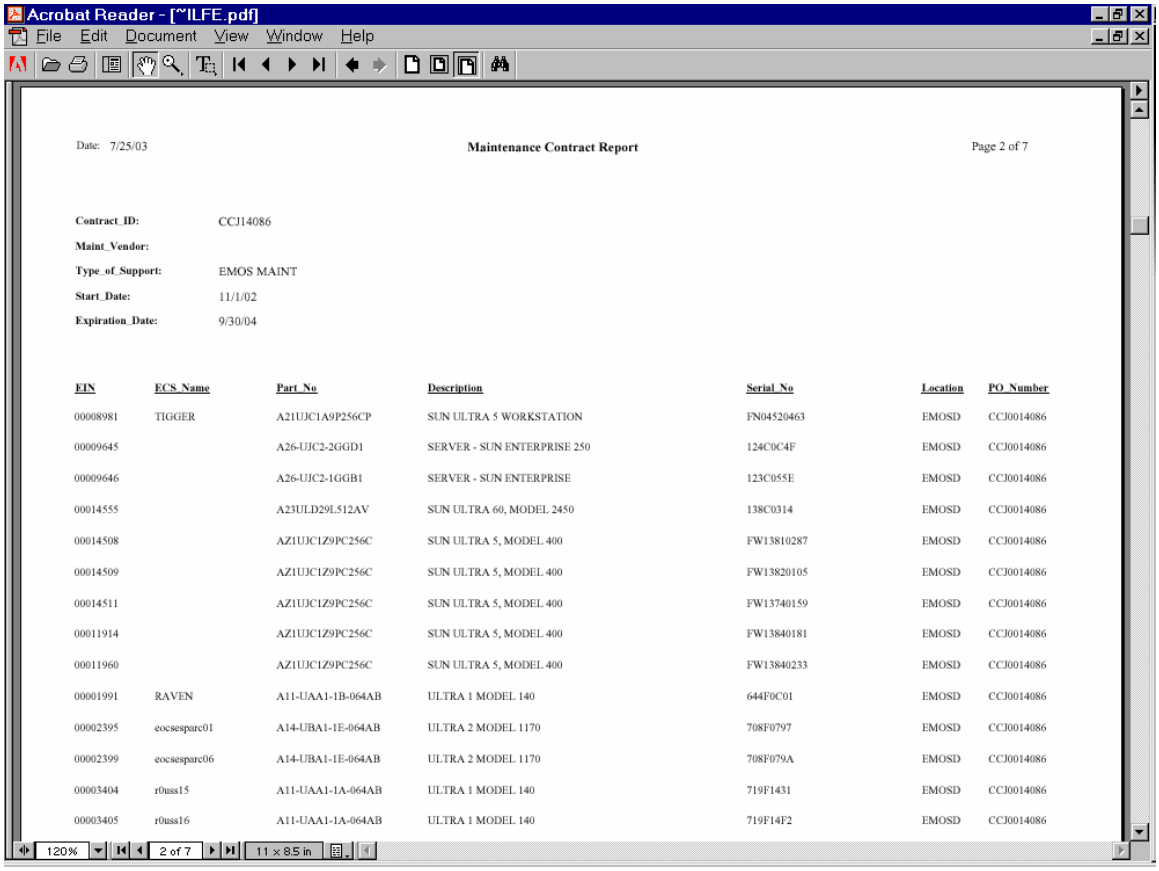


Figure 4.3.4-53. Maintenance Contract Report

Work Order	MFR	DESCRIPTION OF SYSTEM DOWN	SYSTEM NAME	SITE	DATE/TIME Partially/Capabe	TOTAL Partially Capable TIME (HRS)	DATE/TIME SYSTEM DOWN	DATE RETURNED TO OPERATION	TOTAL DOWN TIME (HRS)	Restore Time	Problem Description & Solution	Notes
EDC0000509	SGI	RACK SERVER BASIC CHASIS	e0drg12	EDC	10/16/02 9:00		10/16/02 9:00	10/16/02 10:00	1.0	1.0	System board crashed due to bad node board.	Downtime was the result of troubleshooting and repair actions. System took an hour to restore but was operational.
LaR0000269	STK	9940A	STK Powerderhorn silo2	LaRC	10/15/02 8:00	28.0		10/16/02 12:00			Bad drive. Replace drive.	
EDC0000498	STK	Small Communications Rack	e0hippi1	EDC	09/30/02 5:15	224.7		09/30/02 16:00			Bad HIPPI fiber Channel card going to e0drg12.	No Down time associated because Ops had an alternative path GB router.
EDC0000500	SUN	Enterprise 4000 Enclosure 8-Slot Card Ca	e0sps04	EDC	09/09/02 2:45	8.3		09/09/02 11:00			32MB simm had parity errors causing box to reboot.	There are redundanct cpu boards with memory.

Figure 4.3.4-54. RMA Report

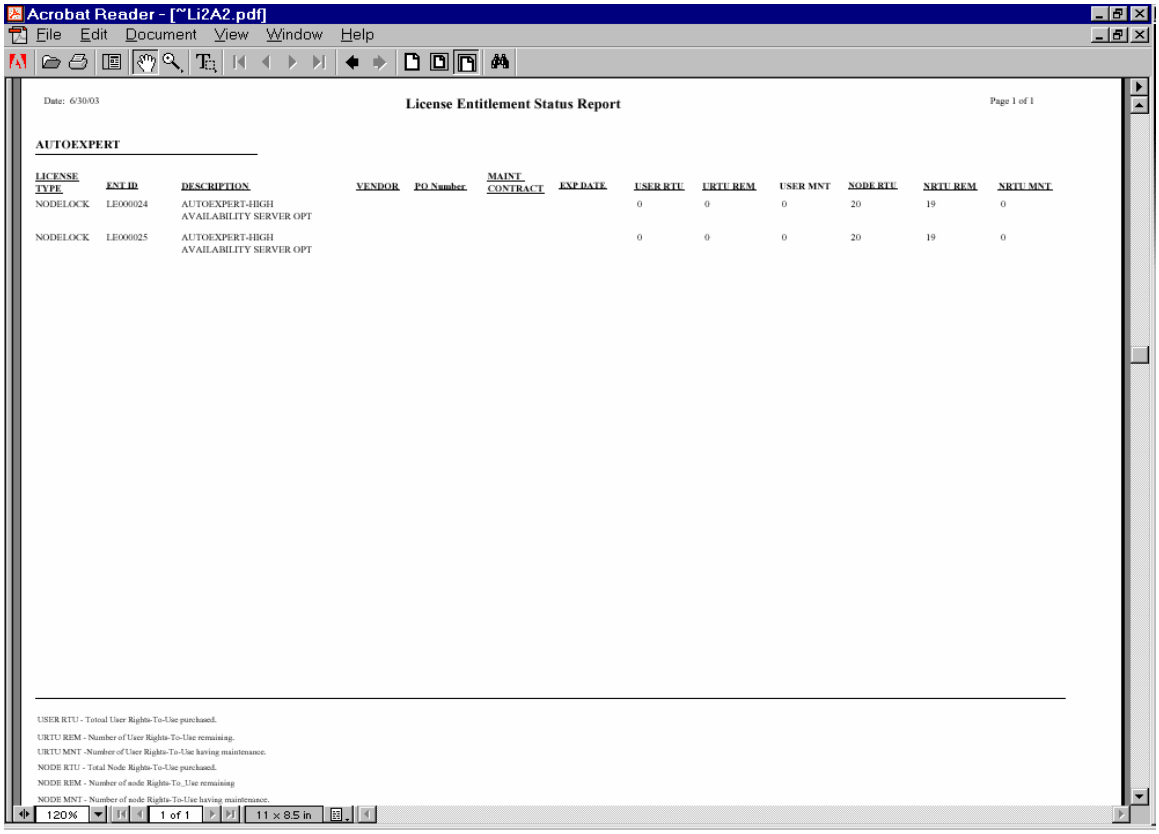


Figure 4.3.4-55. License Entitlements Status Report

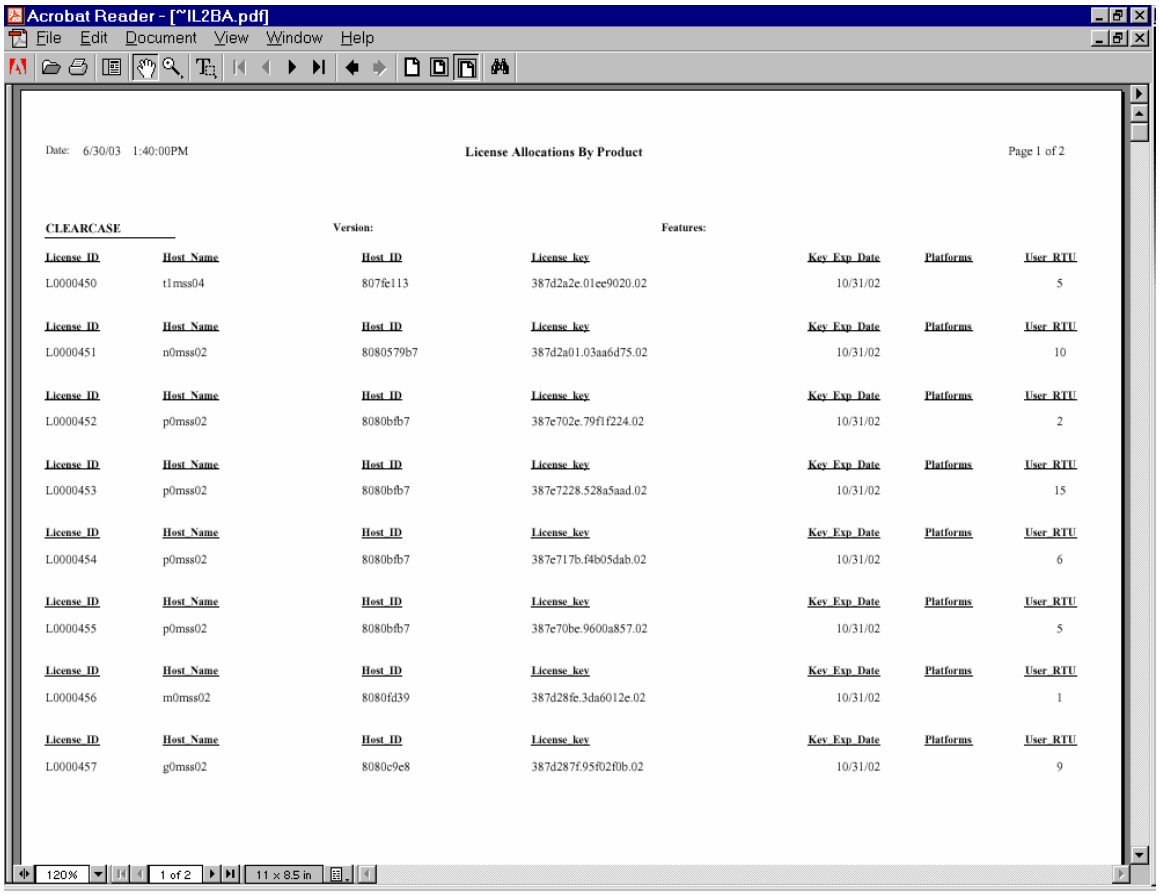


Figure 4.3.4-56. License Allocations by Product Report

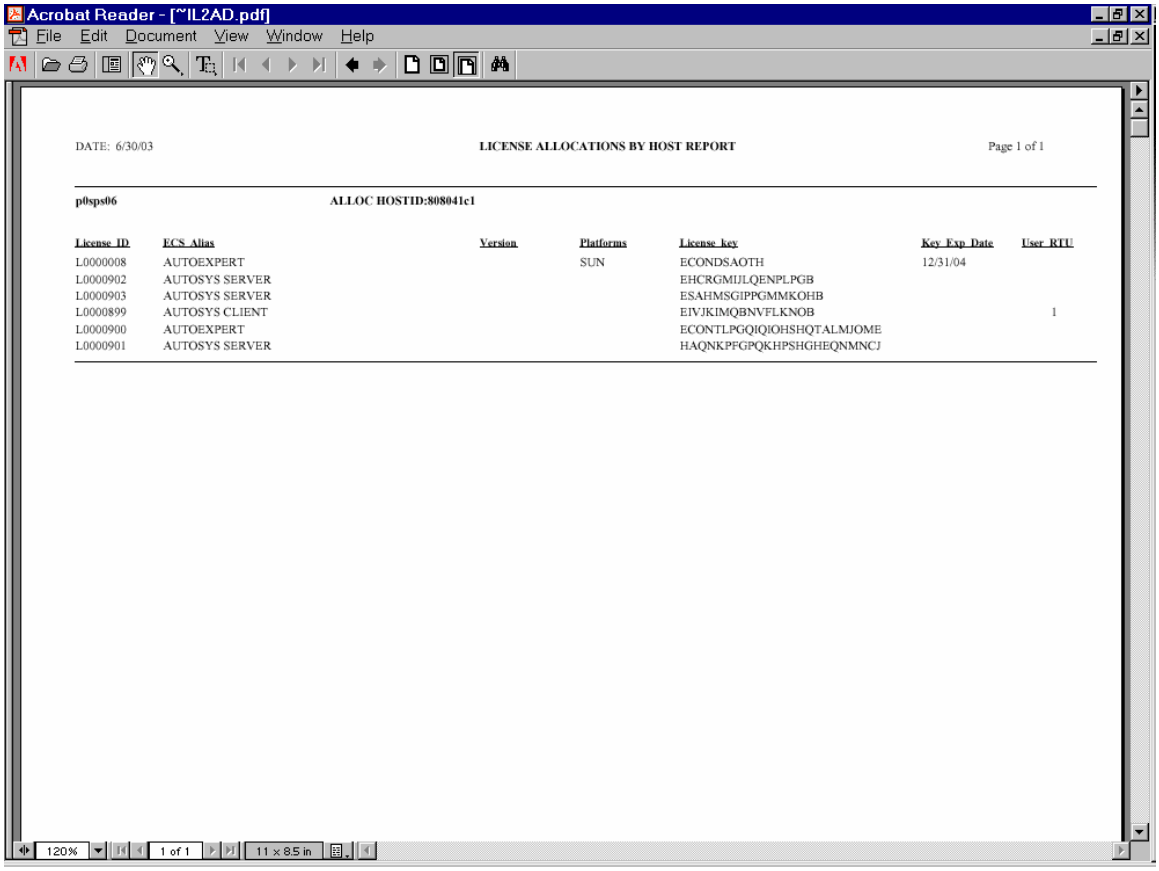


Figure 4.3.4-57. License Allocations by Host Report

4.3.5 FLEXlm

FLEXlm is a commercially available network license management product that helps EMD staffs at ECS sites administer licenses and enforce licensing provisions for FLEXlm-enabled COTS software. It enforces licensing provisions based on information from vendor-provided license keys and lets license administrators allow, deny, or reserve check out of licenses based on user, host, or display. FLEXlm handles floating (concurrent use) licenses, node locked licenses, and combinations of the two.

FLEXlm processing elements include license manager daemons, vendor daemons, license files, and FLEXlm-enabled applications. One or more license manager daemons control vendor daemon operations and enables client applications to contact them. Vendor daemons grant or deny concurrent use licenses requested by applications, tracking how many are checked out and by which users. License files are text files that contain the provisions for one or more licenses from one or more vendors, including the name of the vendor daemon needed to serve the license and the host(s) to use as license server(s). The applications communicate with the license and vendor daemons using embedded FLEXlm client software to request licenses in order to run.

FLEXlm permits use of single, multiple, or redundant server hosts, and can operate more than one license manager daemon on a given node. A license manager daemon serves all the licenses in the license file it uses, and different license files use separate license manager daemons (distinguished by the port number they use to communicate). In a redundant license server configuration, license manager daemons for a license file are executed on three server nodes such that all licenses in the file are available if any two out of the three server nodes is running. In a multiple license server configuration, licenses are allocated among multiple license files and a separate license manager daemon is run for each file.

Table 4.3.5-1 summarizes the operating functions that FLEXlm supports.

Table 4.3.5-1. Common ECS Operating Functions Performed with FLEXlm (1 of 2)

Operating Function	Function Name	Description	When and Why to Use
Start license manager	lmgrd	Starts FLEXlm's main daemon program, which reads the license file and manages vendor daemons and the connections between them and their client applications.	Used to initiate license management server processes.
Stop license manager	lmdown	Shuts down all license daemons (both lmgrd and all vendor daemons) on all nodes.	Used anytime to stop network license activities, such as when the license manager host is to be rebooted.

Table 4.3.5-1. Common ECS Operating Functions Performed with FLEXlm (2 of 2)

Operating Function	Function Name	Description	When and Why to Use
Install decimal format licenses	lminstall	Converts licenses between decimal and readable formats and between different versions of FLEXlm license formats.	Used anytime primarily to install decimal format licenses in readable format.
Read new licenses	lmreread	Causes the license servers to reread the license file they are using and start any new vendor daemons.	Used anytime to put the provisions of an updated license file into effect.
Monitor the status of network licensing activities	lmstat	Generates lists containing such information as active licenses, users of licensed product features, users of individual license management daemons, and status of server nodes.	Used anytime to check on the health and functioning of license server daemons, identify licenses installed, determine licenses in use, or review logged licensing events.
Switch to new report log	lmswitchr	Causes the license servers to use a new or different file as the report log.	Not used. Report logs can be read only by the FLEX*admin* product. FLEX*admin* is not provided in ECS due to security constraints (i.e., use of remote shell utilities).
Verify accuracy of license file	lmcksum	Performs a checksum of a license file.	Used anytime to verify data entry errors in a license file.
Troubleshoot problems serving licenses	lmdiag	Performs problem diagnosis.	Used anytime to help determine why a license cannot be checked out.
Obtain license key from vendor	lmhostid	Reports the hostid of a system.	Used anytime to determine the host code that must be provided to vendors when obtaining a software license.
Recover inaccessible licenses	lmremove	Removes a single user's license for a specified feature.	Used when a client node crashes in order to recover a checked out license not automatically freed.
Determine version compatibility between the license server and an application	lmver	Reports the FLEXlm version of a library of binary files.	Used anytime to determine what version of FLEXlm a FLEXlm-enabled product uses.

4.3.5.1 Quick Start Using FLEXlm

Operators interact with FLEXlm via the license manager daemons and license files. FLEXlm's user interface is a set of Unix-like commands for starting, stopping, and requesting services from

a license manager daemon. Command arguments specify input parameters, most notably the name of the license file whose contents determine the servers, daemons, and license provisions affected by the command. Operators install and maintain license files using any preferred editor.

4.3.5.1.1 Command Line Interface

To start FLEXlm license server daemons in a consistent, predictable manner, execute the following startup script:

>/etc/init.d/lmgrd start

Before it invokes FLEXlm's "lmgrd" program, the script adds the extension ".old" to the current FLEXlm log file (if any) so the new daemon will create its own. It then runs "lmgrd" as user "flexlm" to avoid running as "root", and it specifies the license and log file paths the daemons are to use (i.e., "/usr/local/flexlm/licenses/license.dat" and "/tmp/license_log", respectively).

If license manager daemons are needed to serve licenses in additional license files, they can be started by running the "lmgrd" program as follow:

>su flexlm -c /etc/opt/licenses/lmgrd.ste -c *license_file* -l *logfile* -2 -p & (SUNs only)

>su flexlm -c /etc/opt/licenses/lmgrd -c *license_file* -l *logfile* -2 -p & (SGIs only)

To stop the FLEXlm license daemons that are running on all machines in the network, execute the FLEXlm command:

lmdown

However, to shut down the license manager daemons on a single machine only, log on to the machine and type the following command instead:

>/etc/init.d/lmgrd stop

Table 4.3.5-2 summarizes commands available with FLEXlm. See the *FLEXlm End User's Manual* for the complete description of each command and its arguments.

Table 4.3.5-2. Command Line Interfaces (1 of 2)

Command Line Interface	Description and Format	When and Why Used
lmcksum	lmcksum [-c *license_file*]	To verify license file data.
lmdiag	lmdiag [-c *license_file*] \ [-n] [*feature*]	To diagnose problems when a license cannot be checked out.

Table 4.3.5-2. Command Line Interfaces (2 of 2)

Command Line Interface	Description and Format	When and Why Used
lmdown	lmdown [-c *license_file*] [-q]	To shutdown all license daemons (both lmgrd and all vendor daemons) on all nodes.
lmgrd (SGI) lmgrd.ste (Sun)	lmgrd [-app] [-c *license_file*] \ [-t *timeout_interval*] [-l *logfile*] \ [-s *timestamp_interval*] [-2 -p] [-v] \ [-x lmdown] [-x lmremove]	To run the main daemon program for FLEXlm.
lmhostid	lmhostid [-n]	To determine the hostid of a system.
lminstall	lminstall [-i {*infile* | -}] [-o *outfile*] \ [-overfmt {2 | 3 | 4 | 5 | 5.1 | 6}] \ [-odecimal]	To convert licenses between decimal and readable formats and between different versions of FLEXlm formats.
lmremove	lmremove [-c *file*] *feature user host* \ *display* or lmremove [-c *file*] -h *feature host* \ *port handle*	To remove a single user's license for a specified feature. (This is only needed when a client node crashes, since that's the only condition where a license is not automatically freed. If the application is active, it checks out the license again after it is freed by lmremove.)
lmreread	lmreread [-c *license_file*] \ [–vendor *name*]	To cause the license daemon to reread the license file and start any new vendor daemons that have been added. In addition, one or all pre-existing daemons are signaled to reread the license file for changes in feature licensing information.
lmswitchr	lmswitchr [-c *license file*] *feature* \ *new-file* or lmswitchr [-c license file] *vendor* \ *new-file* *(v5.0+ onl)*	To start recording license events in a new or different log file for the FLEX*admin* tool.
lmstat	lmstat [-a] [-A] [-c *license_file*] \ [-f *feature*] [-i [*feature*]] \ [-S *vendor*] [-s *hostname*] \ [-t *value*]	To report the status of all network licensing activities.
lmver	lmver *filename*	To identify the FLEXlm version of a library or binary file.

4.3.5.2 FLEXlm Main Screen

FLEXlm does not provide for operator interaction via a GUI. All interactions are through the Unix command line or a Unix script.

4.3.5.3 Required Operating Environment

For all COTS packages, appropriate information on operating environments, tunable parameters, environment variables, and a list of vendor documentation can be found in a CM-controlled document for each product. To find the installation and release notes for FLEXlm, refer to the ECS Baseline Information System web page, URL http://cmdm.east.hitc.com/.

4.3.5.4 Databases

FLEXlm uses license and options files in lieu of a database. License files are independent text files, each of which contains all the site-specific information FLEXlm needs to serve the licenses specified in the file. Every license manager daemon requires a license file, and different license files require separate license manager daemons. To simplify operations, operators may combine license files obtained from multiple vendors if they are compatible. Refer to the *FLEXlm End User's Manual* for information about the format of a license file, and when and how to combine them.

Options files are text files associated with specific vendor daemons named in license files. These files allow the operator to specify criteria for granting licenses to users, wait time before reclaiming inactive licenses, and how much license usage information is to be logged. FLEXlm does not require an options file. When specified however, there can only be one options file per vendor daemon, and each vendor needs a separate options file. See the *FLEXlm End User's Manual* for details.

4.3.5.5 Special Constraints

FLEXlm cannot be run without one or more license files, and most FLEXlm commands require the name of a license file in order to execute. License files identify the host and port number a client is to use to communicate with the license server. If the license file parameter is missing from the command, FLEXlm tries using the file(s) named in the environment variable LM_LICENSE_FILE. If LM_LICENSE_FILE is not set, the default license file name */usr/local/flexlm/licenses/license.dat* is assumed.

The *FLEXlm End User's Manual* recommends the following operating constraints:

- Keep a copy or link of the license file in the vendor's "default" location; some vendors expect to find their license files at pre-determined locations. Refer to the FLEXlm *End User's* Manual.
- Run lmgrd as a non-privileged user (not *root)* to avoid security risks. Refer to the FLEXlm *End User's* Manual

4.3.5.6 Outputs

FLEXlm's principal outputs are inter-process communications with COTS applications attempting to check out and check in FLEXlm licenses, but these are generally transparent to the

operator. Outputs visible to the operator include an ASCII log of network licensing events and errors, and messages constituting responses to operator-entered commands.

4.3.5.7 Event and Error Messages

FLEXlm writes both status and error messages to standard output. Typically, operators redirect all output from the startup command "lmgrd" to a file, known as the debug file, to create a FLEXlm log at the site.

See the appendices of the *FLEXlm End User's Manual* lists what causes the more common messages an operator may encounter, but primarily those written by the FLEXlm programs. Event and error messages logged by FLEXlm-enabled COTS applications are sometimes found in the application's manuals. Messages are typically self-explanatory and identify the date/time of the event, the license server host, the product or feature involved, and the name of the user.

4.3.5.8 Reports

FLEXlm's *lmstat* utility can generate the status reports listed in Table 4.3.5-3. Each is written to standard output and may be redirected to a named file or a printer using standard Unix conventions. Reports are generated on demand as required to meet operational needs.

Table 4.3.5-3. Reports

Report Type	Report Description	Example
lmstat -s	Lists status of clients running on a named host.	Figure 4.3.5-1
lmstat -i	Lists license information about all or a named feature.	Figure 4.3.5-2
lmstat -a	Lists all information about current network licensing activities.	Figure 4.3.5-3
lmstat -A	Lists all currently active licenses.	Figure 4.3.5-4
lmstat -f	Lists users of all or a named feature.	Figure 4.3.5-5
lmstat -S	Lists users of all or a named vendor's features.	Figure 4.3.5-6

Note: FLEXlm documentation refers to a report log and a set of license administration reports associated with a companion product, FLEX*admin*. FLEX*admin* is not part of the ECS deployment. *lmstat* does not use the "report log" and does not produce FLEX*admin* reports.

4.3.5.8.1 Sample Reports

The figures (Figure 4.3.5-1 through 4.3.5-6) that follow contain sample FLEXlm status reports. One sample is provided for each report listed in Table 4.3.5-3.

```
lmstat - Copyright (C) 1989-2001 Globetrotter Software, Inc.
Flexible License Manager status on Wed 1/28/2004 14:33

License server status: 1726@p0css02,1726@p0mss07,1726@p0mss10
    License file(s) on p0css02: /usr/local/flexlm/licenses/license.dat:

   p0css02: license server UP v8.0
   p0mss07: license server UP (MASTER) v8.0
   p0mss10: license server UP v8.0

Vendor daemon status (on p0mss07):

  suntechd: UP v4.1
  sunwlicd: UP v7.0
     ICSBX: Cannot read data from license server (-16,287)
 idl_lmgrd: UP v6.1
  rational: UP v7.0
```

Figure 4.3.5-1. All Clients (lmstat -s) Report

```
lmstat - Copyright (C) 1989-2001 Globetrotter Software, Inc.
Flexible License Manager status on Wed 1/28/2004 14:37

NOTE: lmstat -i does not give information from the server,
      but only reads the license file.  For this reason,
      lmstat -a is recommended instead.

Feature                      Version#  licenses     Expires        Vendor
_______                      ________  __________   _______        ______
sunpro.c                      4.200        1        01-jan-0       suntechd
sunpro.cc                     4.200        1        01-jan-0       suntechd
sunpro.sparcworks.tools       4.000        1        01-jan-0       suntechd
sunpro.sw_teamware            2.000        1        01-jan-0       suntechd
sunpro.mpmt                   3.100        1        01-jan-0       suntechd
sunpro.visu                   2.000        1        01-jan-0       suntechd
sunpro.f77                    4.200        1        01-jan-0       suntechd
sunpro.f90                    1.200        1        01-jan-0       suntechd
sunpro.perf                   1.200        1        01-jan-0       suntechd
workshop.c.sparc              6.000        4        01-jan-0       sunwlicd
workshop.cc.sparc             6.000        4        01-jan-0       sunwlicd
workshop.visu.sparc           6.000        4        01-jan-0       sunwlicd
workshop.dbx.sparc            6.000        4        01-jan-0       sunwlicd
workshop.mpmt.sparc           6.000        4        01-jan-0       sunwlicd
workshop.teamware.sparc       6.000        4        01-jan-0       sunwlicd
workshop.tools.sparc          6.000        4        01-jan-0       sunwlicd
workshop.f77.sparc            6.000        4        01-jan-0       sunwlicd
workshop.f90.sparc            6.000        4        01-jan-0       sunwlicd
DatabaseXcessory              1.000        1        01-jan-00      ICSBX
BuilderXcessory               5.000        1        01-jan-00      ICSBX
idl_drawx                     1.000        6        1-jan-0000     idl_lmgrd
insight                       2.000        6        1-jan-0000     idl_lmgrd
idl                           5.500        60       1-jan-0000     idl_lmgrd
ddts                          4.100        5        01-jan-00      rational
PurifyPlusUNIX                5.0          3        31-dec-2003    rational
```

Figure 4.3.5-2. License Information (lmstat -i) Report

```
Flexible License Manager status on Wed 1/28/2004 14:34

License server status: 1726@p0css02,1726@p0mss07,1726@p0mss10
    License file(s) on p0css02: /usr/local/flexlm/licenses/license.dat:

   p0css02: license server UP v8.0
   p0mss07: license server UP (MASTER) v8.0
   p0mss10: license server UP v8.0

Vendor daemon status (on p0mss07):

  suntechd: UP v4.1
  sunwlicd: UP v7.0
     ICSBX: Cannot read data from license server (-16,287)
 idl_lmgrd: UP v6.1
  rational: UP v7.0

Feature usage info:

Users of sunpro.c:  (Total of 1 license available)

Users of sunpro.cc:  (Total of 1 license available)

Users of sunpro.sparcworks.tools:  (Total of 1 license available)

Users of sunpro.sw_teamware:  (Total of 1 license available)

Users of sunpro.mpmt:  (Total of 1 license available)

Users of sunpro.visu:  (Total of 1 license available)

Users of sunpro.f77:  (Total of 1 license available)

Users of sunpro.f90:  (Total of 1 license available)

Users of sunpro.perf:  (Total of 1 license available)

Users of workshop.c.sparc:  (Total of 4 licenses available)

Users of workshop.cc.sparc:  (Total of 4 licenses available)

Users of workshop.visu.sparc:  (Total of 4 licenses available)

Users of workshop.dbx.sparc:  (Total of 4 licenses available)

Users of workshop.mpmt.sparc:  (Total of 4 licenses available)

Users of workshop.teamware.sparc:  (Total of 4 licenses available)

Users of workshop.tools.sparc:  (Total of 4 licenses available)

Users of workshop.f77.sparc:  (Total of 4 licenses available)

Users of workshop.f90.sparc:  (Total of 4 licenses available)

Users of ddts:  (Total of 5 licenses available)

                                                .
                                                .
                                                .
```

Figure 4.3.5-3. All Licensing Activities (lmstat -a) Report

```
lmstat - Copyright (C) 1989-1997 Globetrotter Software, Inc.
Flexible License Manager status on Fri 1/30/2004 08:37

License server status: 1744@jupi,1744@enterprise,1744@intrepid
    License file(s) on jupi: /usr/local/flexlm/licenses/license.dat:

      jupi: license server UP (MASTER) v8.0
enterprise: license server UP v8.0
  intrepid: license server UP v8.0

Vendor daemon status (on jupi):

   xnidaem: UP v6.0
       IDE: UP v4.1
  rational: UP v7.0
   setechd: UP v6.1
 idl_lmgrd: UP v6.1
     ICSBX: The desired vendor daemon is down (-97,380)
    ncdlmd: UP v4.1
   dmccabe: UP v5.11
  suntechd: UP v4.1
   cayenne: UP v5.12
       VNI: UP v6.1
  sunwlicd: UP v7.0

Feature usage info:

Users of ddts:  (Total of 17 licenses available)

  "ddts" v4.100, vendor: rational
  floating license

adupree xserv02 /dev/pts/257 (v4.1) (jupi/1744 591), start Fri 1/30 8:18
jrattiga xserv01 /dev/pts/114 (v4.1) (jupi/1744 1073), start Fri 1/30 8:34

Users of BuilderXcessory: Cannot get users of BuilderXcessory: No such feature exists (-5,222)
Users of DatabaseXcessory: Cannot get users of DatabaseXcessory: No such feature exists (-5,222)
```

Figure 4.3.5-4. All Active Licenses (lmstat-A) Report

```
lmstat - Copyright (C) 1989-1997 Globetrotter Software, Inc.
Flexible License Manager status on Fri 1/30/2004 08:48

License server status: 1744@jupi,1744@enterprise,1744@intrepid
    License file(s) on jupi: /usr/local/flexlm/licenses/license.dat:

      jupi: license server UP (MASTER) v8.0
enterprise: license server UP v8.0
  intrepid: license server UP v8.0

Vendor daemon status (on jupi):

   xnidaem: UP v6.0
       IDE: UP v4.1
  rational: UP v7.0
   setechd: UP v6.1
 idl_lmgrd: UP v6.1
     ICSBX: The desired vendor daemon is down (-97,380)
    ncdlmd: UP v4.1
   dmccabe: UP v5.11
  suntechd: UP v4.1
   cayenne: UP v5.12
       VNI: UP v6.1
  sunwlicd: UP v7.0

Feature usage info:

Users of ada.sun4:  (Total of 30 licenses available)

Users of ddts:  (Total of 17 licenses available)

  "ddts" v4.100, vendor: rational
  floating license

jrattiga xserv01 /dev/pts/114 (v4.1) (jupi/1744 1073), start Fri 1/30 8:34
zyu xserv01 /dev/pts/205 (v4.1) (jupi/1744 592), start Fri 1/30 8:46

Users of PurifyPlusUNIX:  (Error: 10 licenses, unsupported by licensed server)

Users of workshop.teamware.sparc:  (Total of 15 licenses available)

Users of workshop.tools.sparc:  (Total of 15 licenses available)

Users of workshop.f77.sparc:  (Total of 15 licenses available)

Users of workshop.f90.sparc:  (Total of 15 licenses available)

                                                .
                                                .
                                                .
```

Figure 4.3.5-5. Users of All or Named Features (lmstat-f) Report

```
lmstat - Copyright (C) 1989-1997 Globetrotter Software, Inc.
Flexible License Manager status on Fri 1/30/2004 08:50

Feature usage info:

Users of ada.sun4:  (Total of 30 licenses available)

Users of ddts:  (Total of 17 licenses available)

  "ddts" v4.100, vendor: rational
  floating license

jrattiga xserv01 /dev/pts/114 (v4.1) (jupi/1744 1073), start Fri 1/30 8:34
zyu xserv01 /dev/pts/205 (v4.1) (jupi/1744 592), start Fri 1/30 8:46
aadekunj xserv01 /dev/pts/134 (v4.1) (jupi/1744 951), start Fri 1/30 8:50

Users of PurifyPlusUNIX:  (Error: 10 licenses, unsupported by licensed server)

Users of workshop.f77.sparc:  (Total of 15 licenses available)

Users of workshop.f90.sparc:  (Total of 15 licenses available)

                                                .
                                                .
                                                .
```

Figure 4.3.5-6. Users of All or Named Vendor's Features (lmstat-S) Report

4.3.6 TestTrack Pro

TestTrack Pro (TTPro) provides a Trouble Ticketing service that furnishes both ECS users and operations personnel at the DAACs a common environment for classifying, tracking, and reporting the occurrence and resolution of system-related problems. The Trouble Ticketing Service:

- Provides a GUI for operations personnel to access all Trouble Ticket functions
- Provides a common Trouble Ticket entry format
- Stores Trouble Tickets
- Retrieves Trouble Tickets via ad-hoc queries
- Allows operations personnel to escalate problems to Landover for review and resolution
- Generates reports and statistics
- Interfaces with user's and operator's e-mail to provide automatic notification
- Offers an application programming interface, Simple Object Access Protocol (SOAP) Software Development Kit (SDK), through which applications can submit and manage Trouble Tickets
- Generates a variety of reports about Trouble Tickets, including trend reports
- Defines a consistent "life-cycle" for Trouble Tickets
- Can be extended readily due to its highly customizable fields, workflow rules, system notifications, and user permissions.

TTPro gives ECS operators, technicians, and managers the means to manage a system defect through its lifecycle, whether as a Trouble Ticket at a DAAC or a non-conformance report at Landover. Within TTPro a separate project (also known as a "database") exists for each ECS site's Trouble Tickets.

TTPro has a client/server architecture. The server is hosted on a Linux machine at Landover, while client access is available locally or remotely via Windows-, Linux-, and Web-based clients.

User Services and other operations and support personnel use TTPro to perform the functions listed in Table 4.3.6-1. The sections that follow describe the GUIs that perform these functions, many of which include customizations made for ECS. Standard product features are mentioned but not discussed in detail. For more information about them, use the context sensitive help the tool provides, or refer to the following vendor documents for TestTrack Pro 7.5.4:

- *Getting Started*
- *TestTrack Pro Client User Guide*
- *TestTrack Pro Web User Guide*
- *Seapine License Server Admin Utility Guide, Version 3.1*

Table 4.3.6-1. Common ECS Operating Functions Performed using TestTrack Pro (1 of 3)

Operating Function	GUI (Section)	Description	When and Why to Use
Access defect tracking services	Login screen (4.3.6.1.1)	• Operators start their client of choice and use the Login screen to access a TTpro project. The Login screen is the gateway to TestTrack Pro's features. By default, users land on the Trouble Ticket list screen from where all other functions can be performed.	When there is a need to submit, query, or revise a Trouble Ticket
Submit a Trouble Ticket	Add Trouble Ticket screen (4.3.6.2.2)	• Operators add a new Trouble Ticket to the system. • Trouble Ticket form is used to enter information about the problem	When a problem is either found by or reported to User Services.
Browse Trouble Tickets	Edit Trouble Ticket or Edit NCR screen (4.3.6.2.3)	• Operators review existing Trouble Tickets. • Allows entry of new information about the problem and recording of events that advance the defect report through its lifecycle states.	When information needs to be added to a Trouble Ticket or when a Trouble Ticket needs to be viewed.
Escalate a Trouble Ticket to the EDF	Escalate screen (4.3.6.2.4.5)	• Operators raise an Escalate event that forwards a specified Trouble Ticket to the EDF. • A script uses TTPro's SOAP API to create an NCR automatically using information from the Trouble Ticket. • Notifications are sent to the EDF and the ticket owner that an NCR has been created.	When assistance in resolving the Trouble Ticket is needed from the EDF or the problem requires a hardware or software change.

Table 4.3.6-1. Common ECS Operating Functions Performed using TestTrack Pro (2 of 3)

Operating Function	GUI (Section)	Description	When and Why to Use
Generate reports	Reports screen (4.3.6.2.5)	• Operators run or create new reports. The screen is accessed from the Trouble Ticket list screen. Reports can be viewed, created, edited, deleted, printed, or previewed by selecting the appropriate button on the Reports screen.	When information is needed about one or more Trouble Tickets
Add, delete, or modify user accounts	License Server Admin tool's Global Users screen (4.3.6.2.13) TTPro Client Edit Users screen (4.3.6.2.8)	• TTPrp administrators add, delete, and modify user profiles, including user IDs and passwords. • TTPro administrators assign operators and users to a security groups on a project-by-project basis. Each project's security groups enforce what the operator or user can do in that project.	When there is a need to update: 1) the list of operators and users authorized to access each project; 2) what features and records an operator or user can access; 3) contact information and/or passwords; and. 4) reset individual passwords.
Customize pulldown menus	Setup <field> Names screens (4.3.6.2.9-4.3.6.2.11)	• TTPro administrators add, edit, reorder, and delete values used in TTPro's field pulldown menus. This ensures that data is entered uniformly in fields used for categorizing defects.	When current menus require updating.

Table 4.3.6-1. Common ECS Operating Functions Performed using TestTrack Pro (3 of 3)

Operating Function	GUI (Section)	Description	When and Why to Use
Issue Notifications	Configure System Notification Rules screen	• TTPro administrators configure rules used by TTPro for issuing system notifications to individual operators and users. System notifications are used primarily to alert defect report assignees, submitters, etc. when their defect report or its status has changed.	To inform someone via e-mail when a Trouble Ticket or NCR changes in one or more of a variety of ways.
	Edit Trouble Ticket or Edit NCR screens	• Operators and users designate particular individuals to receive an e-mail whenever a Trouble Ticket or NCR has changed.	
	User Options screen (4.3.6.2.10 & 4.3.6.2.11)	• Operators and users define personal rules the system uses to e-mail them about changes to defect reports they are authorized to see.	

4.3.6.1 Quick Start Using TestTrack Pro

This section describes how to invoke TTPro. For more information, use the context sensitive help the tool provides, or refer to the following vendor documents:

- *Getting Started*
- *TestTrack Pro Client User Guide*
- *TestTrack Pro Web User Guide*

4.3.6.1.1 Invoking TestTrack Pro

Each of the three TTPro clients are started differently.

To start the Windows client:

> Click `Start` → `All Programs` → `Seapine Sofware` → `TestTrack Pro` → `TestTrack Pro Client` on your desktop.

To start the Linux client, logon the TTPro server machine and enter:

```
/usr/ecs/OPS/COTS/ttpro/bin/ttclient &.
```

To start the Web client, open a browser and enter the following URL:

```
https://links.gsfc.nasa.gov:<port>
```

A Login GUI similar to that in Figure 4.3.6-1 will appear. Select the TTPro Server and Project you want to access, and enter your TTPro Username (i.e., login ID) and password. Since the URL for Web client already specifies the server to use, its Login GUI requests only the Project, Username, and Password.

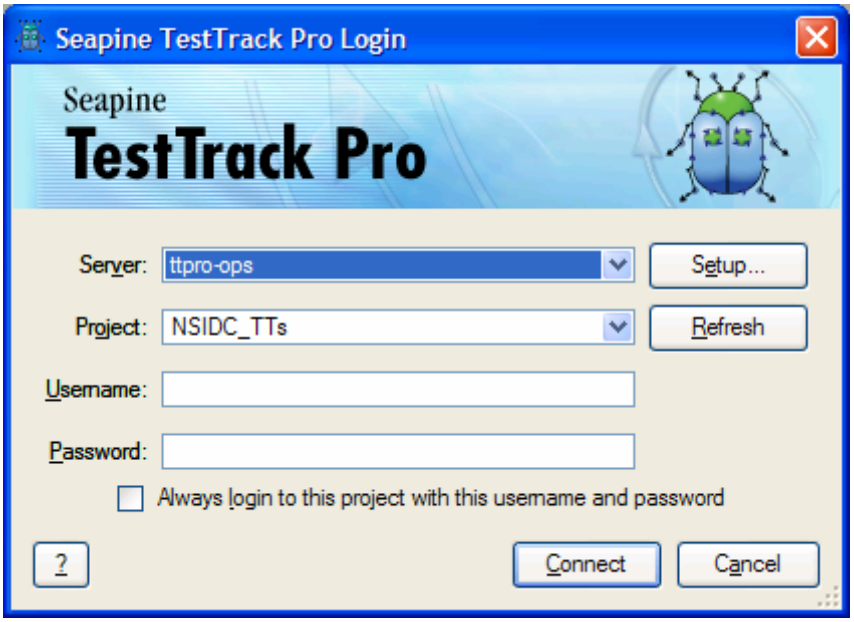


Figure 4.3.6-1. Seapine TestTrack Pro Login GUI

Table 4.3.6-2 provides a description of the Login screen's field.

Table 4.3.6-2. Trouble Tickets List Field Descriptions

Field Name	Data Type	Size	Entry	Description
Server	Selection	*	Required	Name of TTPro server connection
Project	Selection	*	Required	Name of the project to logon to
Username	Selection	*	Required	User's TTPro login id
Password	Selection	*	Required	User's TTPro password

***Note:** the size of a field with a "selection" data type can vary and the size is automatically adjusted to the size of the item selected from the selection list.

The Login screen has the following buttons:

- **Setup…** Opens the Edit TestTrack Pro Server GUI for defining server connections

- **Refresh** Retrieves the latest list of available TTPro projects
- **Connect** Opens a Trouble Ticket for modification.
- **Cancel** Deletes operator-selected Trouble Tickets.

If using TTPro for the first time, the Edit TestTrack Pro Server GUI will appear so you can define a TTPro server connection. (See Figure 4.3.6-2) Your TTPro administrator can help you set up the connection.

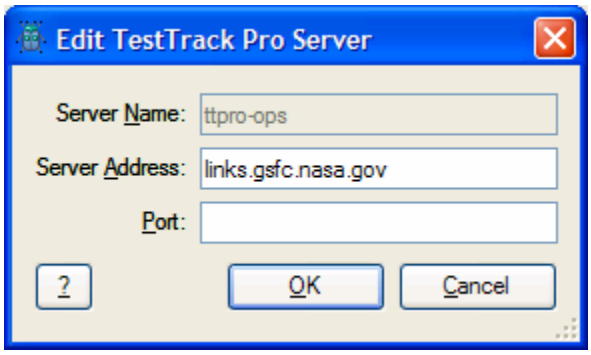


Figure 4.3.6-2. Contact Log Form GUI

Table 4.3.6-3 provides a description of the Edit TestTrack Pro Server screen's field.

Table 4.3.6-3. Edit TestTrack Pro Server Field Descriptions

Field Name	Data Type	Size	Entry	Description
Server Name	Character	> 200	Required	Name of TTPro server connection
Server Address	Character	> 200	Required	Fully qualified domain name of the TTPro server
Port	Integer	5	Required	Port on which TTPro clients communicate with the TTPro server

***Note**: the size of a field with a "selection" data type can vary and the size is automatically adjusted to the size of the item selected from the selection list.

The sections that follow describe the screens displayed by the Windows and Linux clients. The Web Client provides the same functionality and fields, but the displays and user interactions are necessarily somewhat different.

4.3.6.2 Main Screen

TTPro's main screen is shown in Figure 4.3.6-3. From here Trouble Tickets can be submitted, queried, modified, and escalated. The GUI can manage multiple windows concurrently, and it offers a menu bar and a complement of movable toolbars for easily navigating system screens.

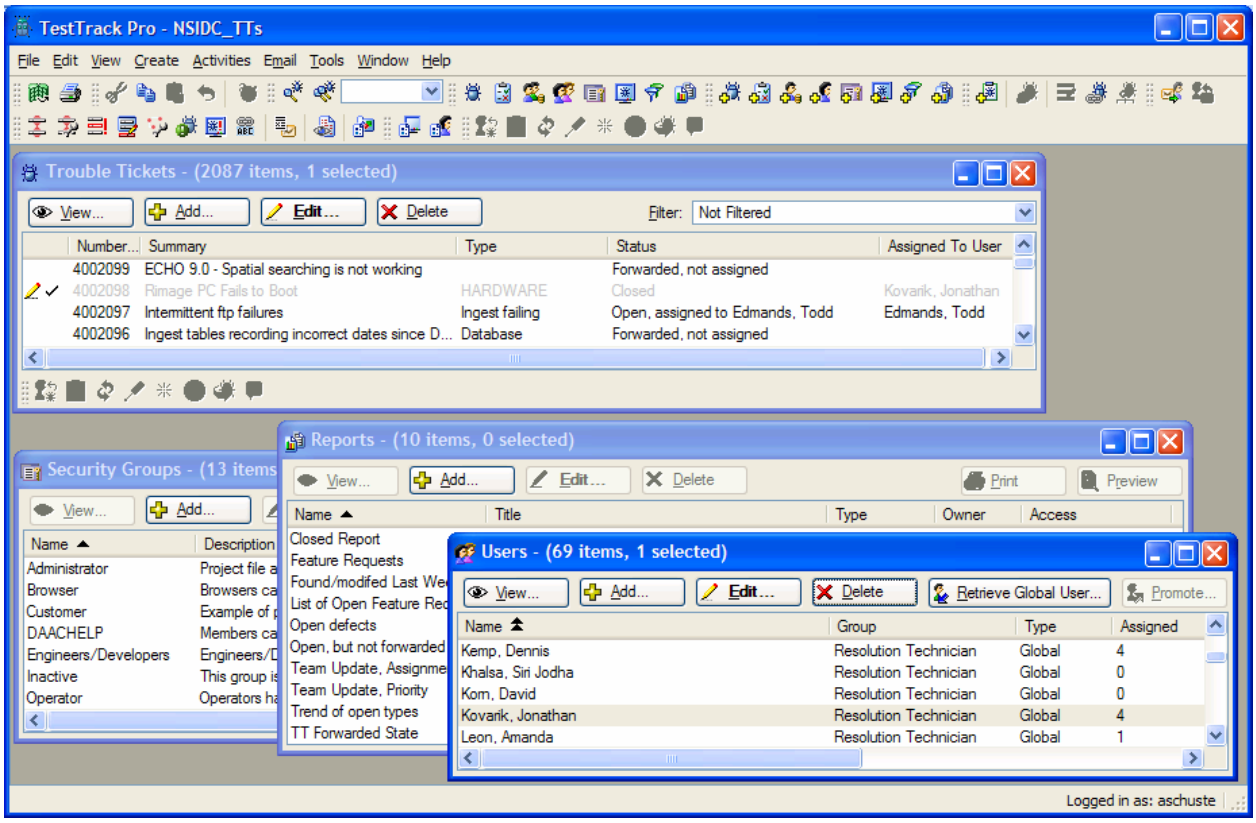


Figure 4.3.6-3. Main GUI

4.3.6.2.1 Trouble Ticket List Screen

Operators and users use the Trouble Ticket List screen (see Figure 4.3.6-4) to browse, select, and open one or more Trouble Tickets. Use the Filter pull down menu to retrieve the records you want. Initiate action on a Trouble Ticket by clicking on a row then on one of the action buttons. Initiate action on multiple records by dragging your mouse over several rows before pressing the action button.

The screen can be configured to display data as you prefer. Insert or remove columns of data by right-clicking on the column heading. Adjust the width of a column by dragging the bar in the column heading that separates it from its neighbor, or double-click on the bar to size it automatically. Sort the data by clicking on a column heading; add a secondary sort by holding the Shift key and clicking on a second column heading.

Important: Exit the screen by selecting `File → Logout & Disconnect` from the TTPro menu bar. Otherwise, the system may not release the license immediately.

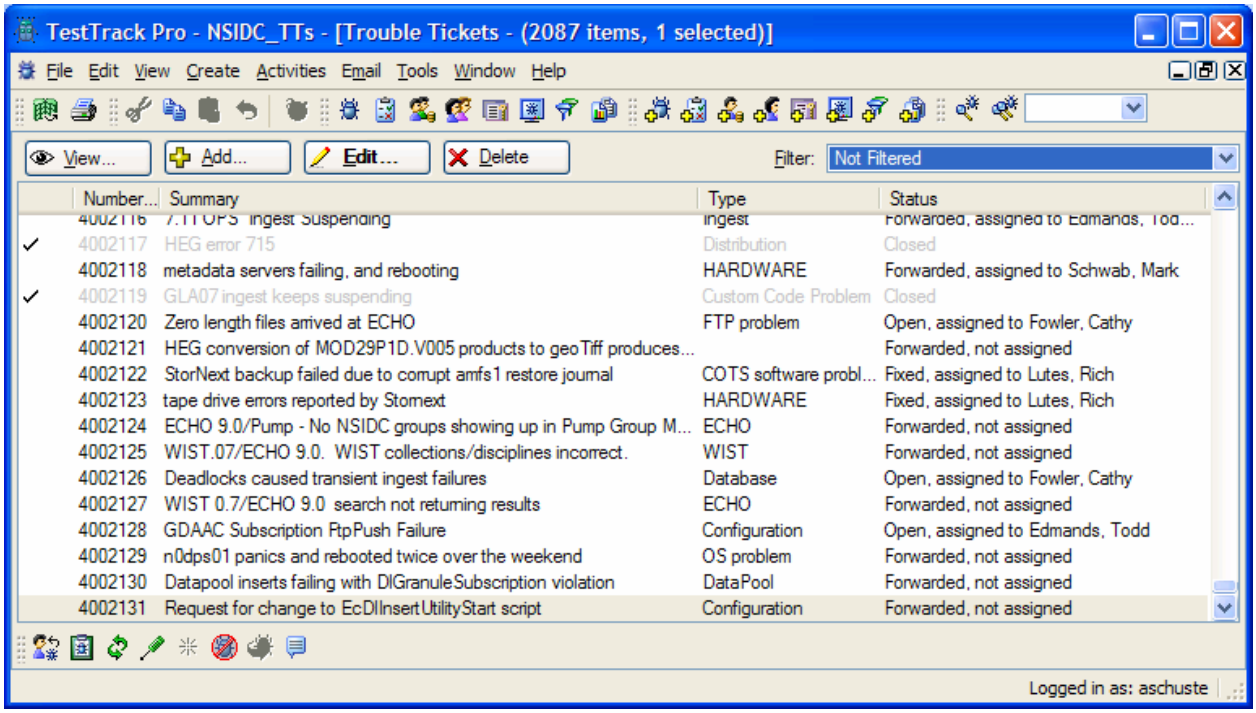


Figure 4.3.6-4. Trouble Tickets List GUI

Table 4.3.6.4 provides a description of the Trouble Ticket List screen's field.

Table 4.3.6-4. Trouble Tickets List Field Descriptions

Field Name	Data Type	Size	Entry	Description
Filter	Selection	*	Optional	Name for the set of criteria to be used by the system to determine which Trouble Tickets to display

***Note**: the size of a field with a "selection" data type can vary and the size is automatically adjusted to the size of the item selected from the selection list.

The Trouble Tickets List screen has the following buttons:

- **View…** Opens a Trouble Ticket for viewing only.
- **Add…** Opens the Add Trouble Ticket screen for submitting a new Trouble Ticket.
- **Edit…** Opens a Trouble Ticket for modification.
- **Delete** Deletes operator-selected Trouble Tickets.

4.3.6.2.2 Add Trouble Ticket Screen

The Add Trouble Ticket screen (Figure 4.3.6-5) is used for reporting an operational issue or problem in ECS. Clicking **Add** on this screen creates the Trouble Ticket and commits the data to the database.

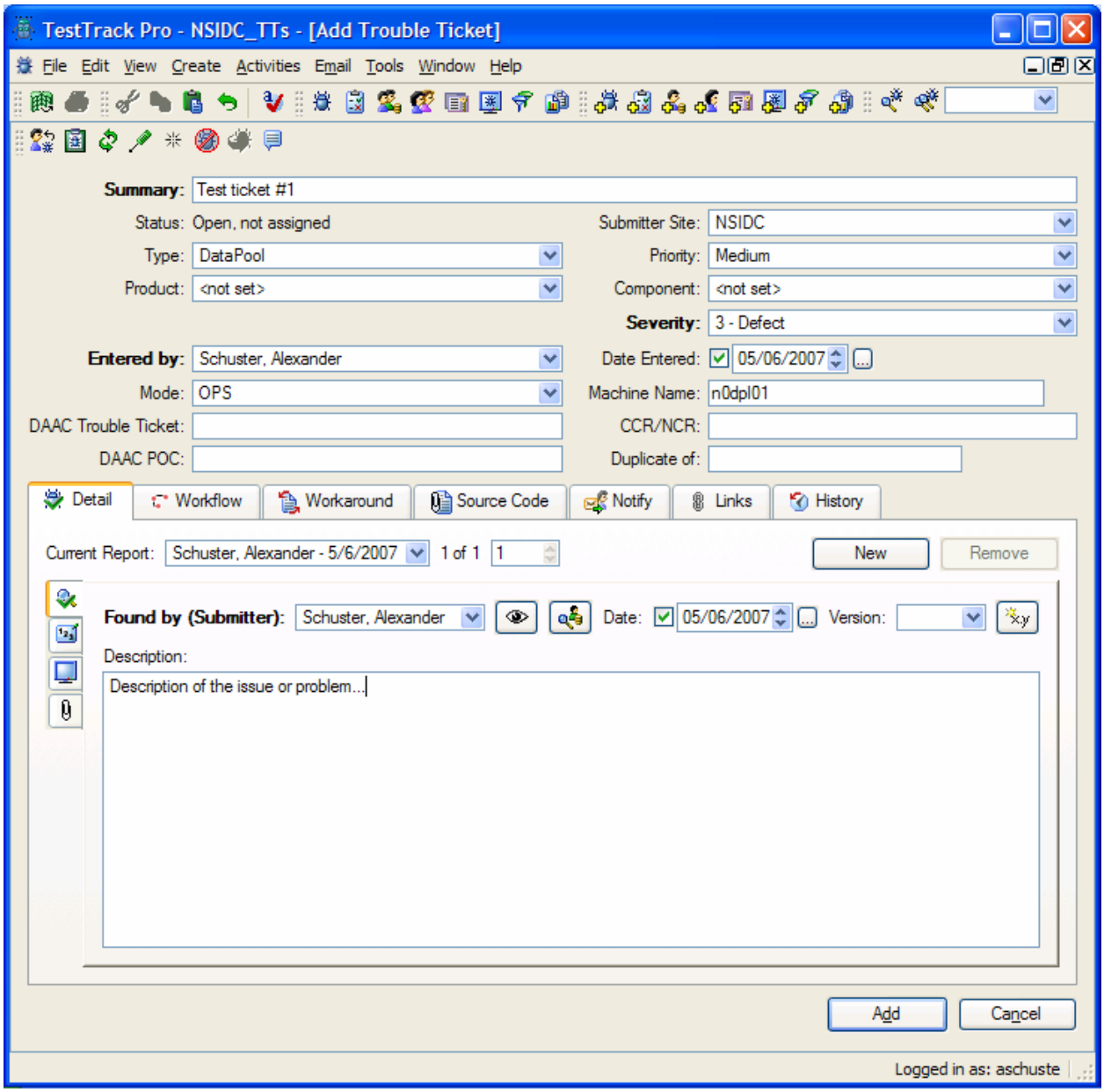


Figure 4.3.6-5. Add Trouble Ticket GUI

Table 4.3.6.5 provides a description of the Add Trouble Ticket screen's fields.

Table 4.3.6-5. Add Trouble Ticket GUI (1 of 2)

Field Name	Data Type	Size	Entry	Description
Number	Integer	8	System generated	Ticket number, which is set and maintained by the system.
Summary	Character	154	Required	Short Description of the problem.
Status	Character	n/a	System generated	Status of the Trouble Ticket (a combination of state and assignment status)
Submitter Site	Selection	*	Optional	Trouble ticket's originating site
Type	Selection	*	Optional	Type of problem or issue (e.g., Configuration Error, Hardware Problem, Software Problem)
Priority	Selection	*	Optional	Priority of Trouble Ticket assigned at the site.
Product	Selection	*	Optional	Product exhibiting the problem or issue
Component	Selection	*	Optional	Product's component exhibiting the problem or issue. In legacy (Remedy) tickets, it is the name of the configuration item with which the problem is associated.
Severity	Selection	*	Required	Impact of the problem to the submitter.
Entered by	Selection	*	Required	Name of the person who created the Trouble Ticket
Date Entered	Date	n/a	Optional	Date Trouble Ticket was created
Description	Character	4060	Optional	Detailed description of the problem
Mode	Selection	*	Optional	Run mode in which problem was detected
Machine Name	Character	n/a	Optional	Name of machine on which problem was detected
DAAC Trouble Ticket	Character	n/a	Optional	Legacy identifier of Trouble Ticket (from Remedy ARS)
CCR/NCR	Character	n/a	Optional	Identifier of a related CCR or NCR. If more than one, separate each by a space or semicolon for readability.
DAAC POC	Character	n/a	Optional	Name of the issue's point of contact at the DAAC. Used when escalating Trouble Tickets to Landover PRB for advice or resolution.
Duplicate of	Character	n/a	Optional	Identifier of an earlier Trouble Ticket addressing the same issue
Current Report	Selection	*	Optional	Submitter and date of an occurrence of the problem or issue. Helps browse through multiple reports of the same issue

Table 4.3.6-5. Add Trouble Ticket GUI (2 of 2)

1 of *n*	Selection	*	System Generated	Identifier that distinguishes among multiple instances or reports of the same problem or issue
Found by (Submitter)	Selection	*	Required	Full Name of the Submitter
Date	Date	n/a	Optional	Date issue or problem occurred
Version	Selection	*	Optional	Product version exhibiting the issue

*** Note**: The size of a field with a "selection" data type can vary and the size is automatically adjusted to the size of the item selected from the selection list.

4.3.6.2.3 Edit Trouble Ticket Screen

The Edit Trouble Ticket (Figure 4.3.6-6) screen is used to update an existing Trouble Ticket and advance it through its lifecycle states. The latter is done by selecting an appropriate item on the Activities menu or clicking the appropriate Activities icon (in this view, the second row of icons on the toolbar), either of which opens an Activity screen (see Section 4.3.6.2.4).

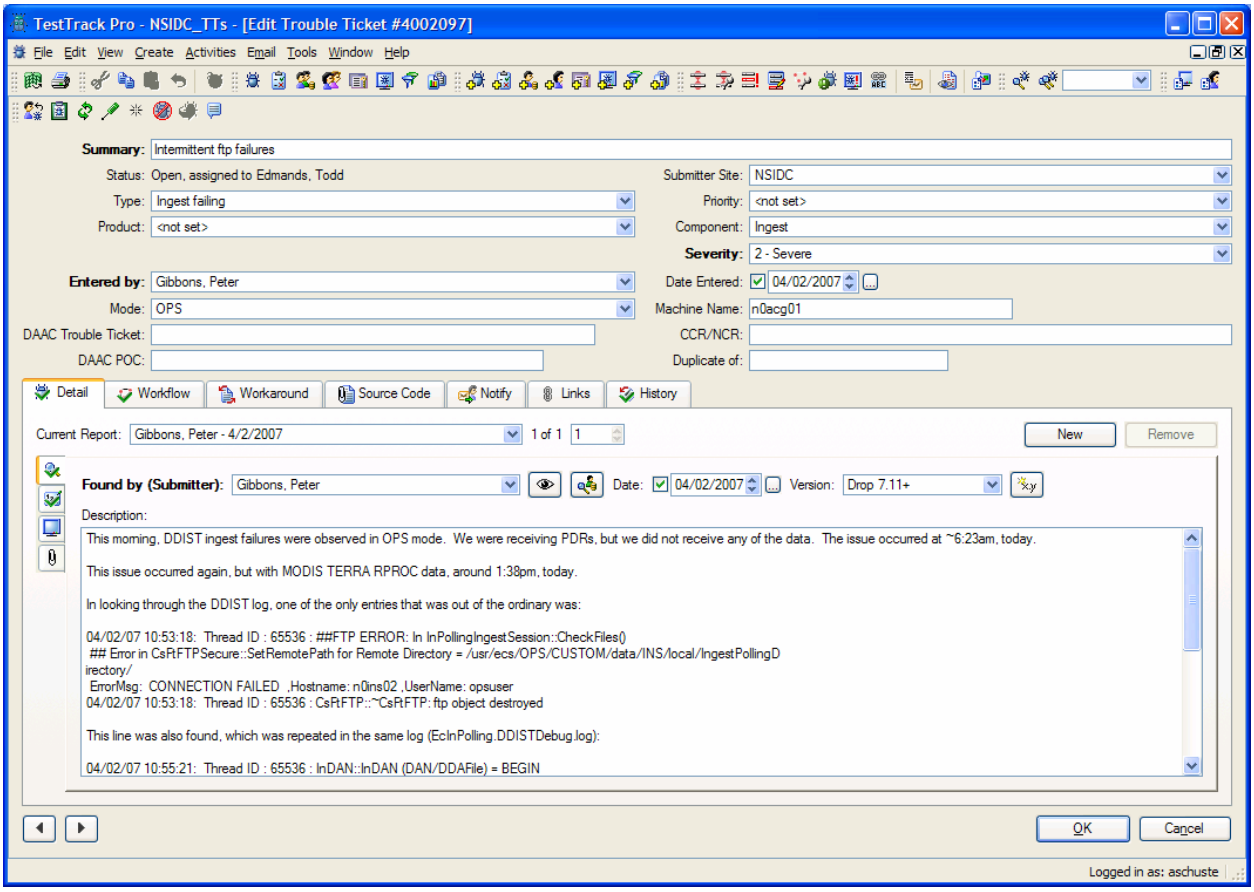


Figure 4.3.6-6. Edit Trouble Ticket GUI

This screen has three buttons that differ from those on the Add Trouble Ticket screen:

- **OK** Commits changes to the database
- **Left arrow** Commits changes to the database and displays the previous Trouble Ticket in the Trouble Ticket list
- **Right arrow** Commits changes to the database and displays the next Trouble Ticket in the Trouble Ticket list

4.3.6.2.4 Activity Screens

The screens in this section advance Trouble Tickets through their lifecycle states.

Each activity screen has the following buttons:

- **OK** Accepts entered data and **c**loses the screen
- **Cancel** Closes the screen without accepting entered data.

Important: Clicking **OK** does not update the database. The database is updated only when subsequently closing the calling Add Trouble Ticket or Edit Trouble Ticket screens.

4.3.6.2.4.1 Assign Screen

The Assign screen (Figure 4.3.6-7) is used for recording that a staff member has been assigned to work on the issue described by the Trouble Ticket.

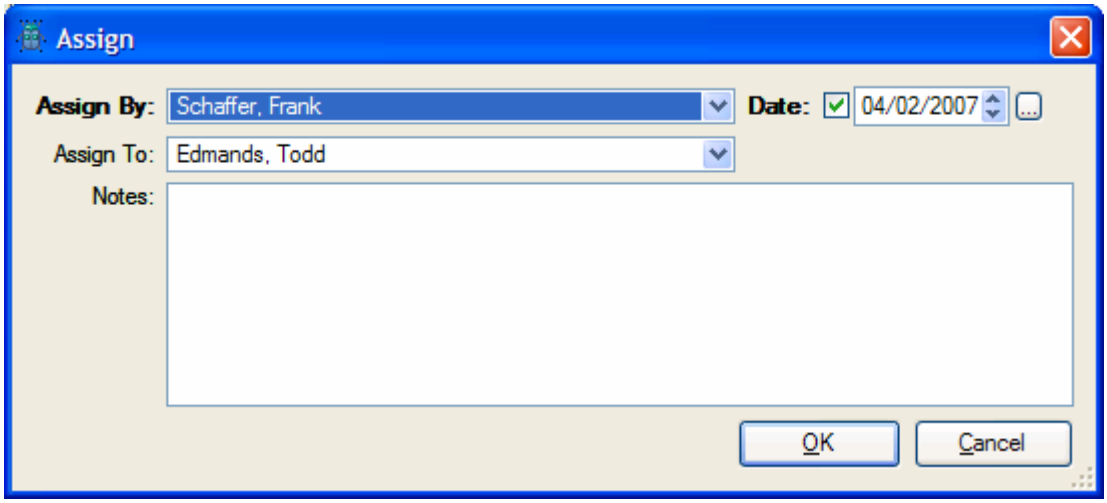


Figure 4.3.6-7. Assign GUI

Table 4.3.6.6 provides a description of the Assign screen's fields.

Table 4.3.6-6. Assign Field Descriptions

Field Name	Data Type	Size	Entry	Description
Assign By	Selection	32	Required	Who is making the assignment
Date	Date/Time	n/a	Required	Date assignment is made
Assign To	Selection	32	Optional	Name of the assignee
Notes	Text		Optional	Message for the assignee

***Note**: The size of a field with a "selection" data type can vary and the size is automatically adjusted to the size of the item selected from the selection list.

4.3.6.2.4.2 Propose Solution Screen

The Propose Solution screen (Figure 4.3.6-8) is used for documenting how to resolve the issue described by the Trouble Ticket. Clicking **OK** on this screen advances the Trouble Ticket to the Solution Proposed state.

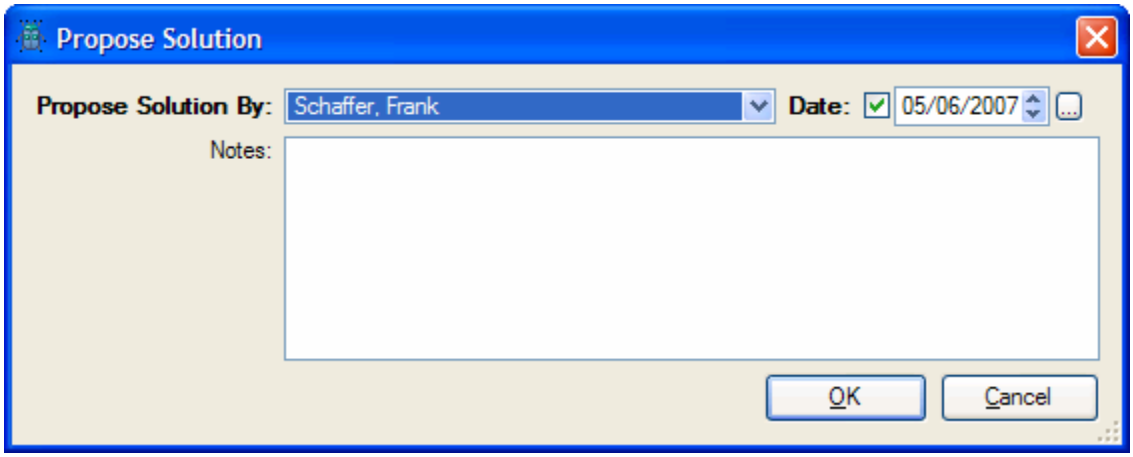


Figure 4.3.6-8. Propose Solution GUI

Table 4.3.6.7 provides a description of the Propose Solution screen's fields.

Table 4.3.6-7. Propose Solution Field Descriptions

Field Name	Data Type	Size	Entry	Description
Propose Solution By	Selection	32	Required	Who is proposing the solution
Date	Date/Time	n/a	Required	Date solution is proposed
Notes	Text	n/a	Optional	The proposed solution

***Note:** the size of a field with a "selection" data type can vary and the size is automatically adjusted to the size of the item selected from the selection list.

4.3.6.2.4.3 Start to Implement Screen

The Start to Implement screen (Figure 4.3.6-9) is used for documenting work towards implementing the solution to the problem described in the Trouble Ticket. Clicking OK on this screen advances the TroubleTticket to the Start to Implement state.

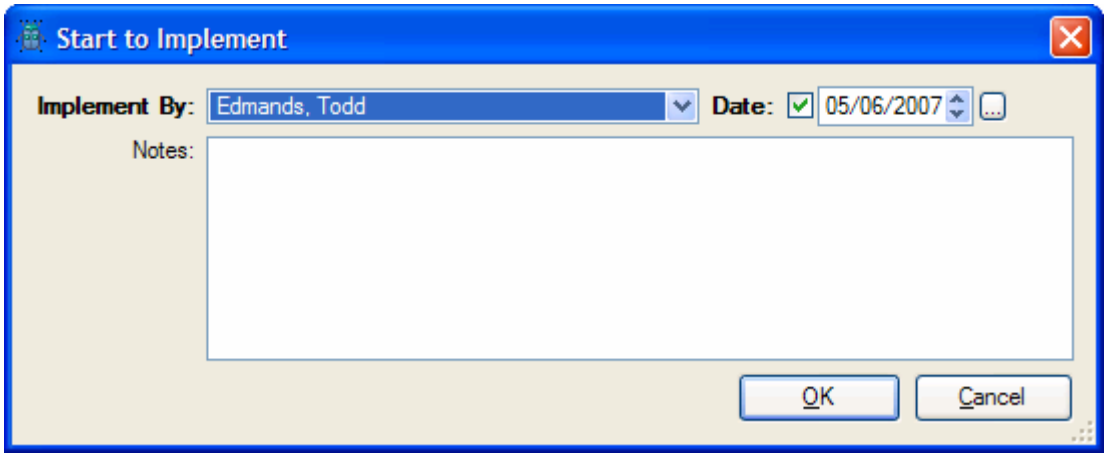


Figure 4.3.6-9. Start to Implement GUI

Table 4.3.6.8 provides a description of the Start to Implement screen's fields.

Table 4.3.6-8. Start to Implement Field Descriptions

Field Name	Data Type	Size	Entry	Description
Implement By	Selection	32	Required	Who is implementing the solution
Date	Date/Time	n/a	Required	Date work started towards a solution
Notes	Text	n/a	Optional	Details on progress towards solution

***Note**: the size of a field with a "selection" data type can vary and the size is automatically adjusted to the size of the item selected from the selection list.

4.3.6.2.4.4 Fix Screen

The Fix screen (Figure 4.3.6-10) is used for reporting that the issue described in the Trouble Ticket has been solved. Clicking **OK** on this screen advances the Trouble Ticket to the Fixed state.

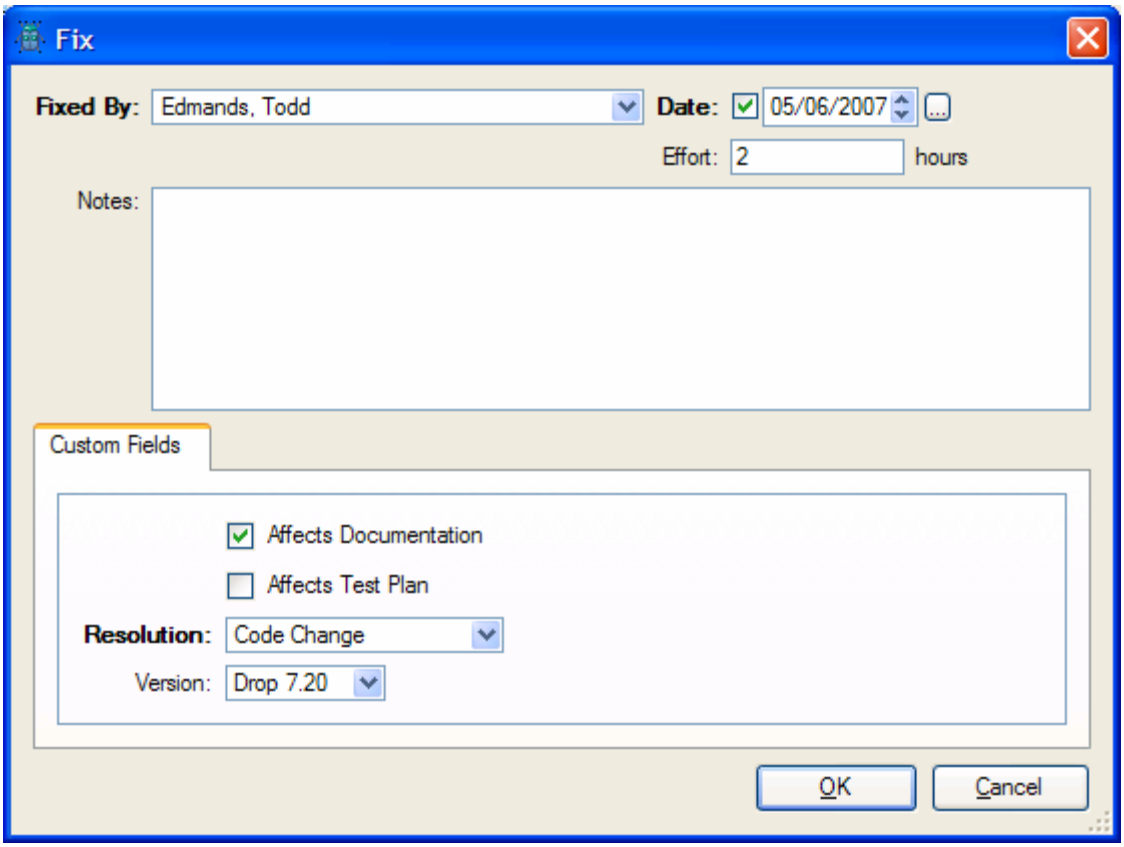


Figure 4.3.6-10. Fix GUI

Table 4.3.6.9 provides a description of the Fix screen's fields.

Table 4.3.6-9. Fix Field Descriptions

Field Name	Data Type	Size	Entry	Description
Fixed By	Selection	32	Required	Who fixed the problem
Date	Date/Time	n/a	Required	Date solution was implemented
Effort	Decimal		Optional	Hours it took to resolve the issue
Notes	Text		Optional	Details of how the issue was resolved
Affects Documentation	Check box	n/a	Optional	Is a documentation change req'd?
Affects Test Plan	Check box	n/a	Optional	Is a test plan change req'd?
Resolution	Selection	*	Required	Type of resolution
Version	Selection	*	Optional	Product version first containing fix

***Note**: the size of a field with a "selection" data type can vary and the size is automatically adjusted to the size of the item selected from the selection list.

4.3.6.2.4.5 Escalate Screen

The Escalate screen (Figure 4.3.6.11) is used for forwarding an issue to the Landover Problem Review Board (PRB) for advice or resolution. Clicking **OK** on this screen advances the Trouble Ticket to the Forwarded state.

Note: A cron job runs periodically to extract the data from escalated Trouble Tickets in order to create corresponding ECS non-conformance reports (NCRs).

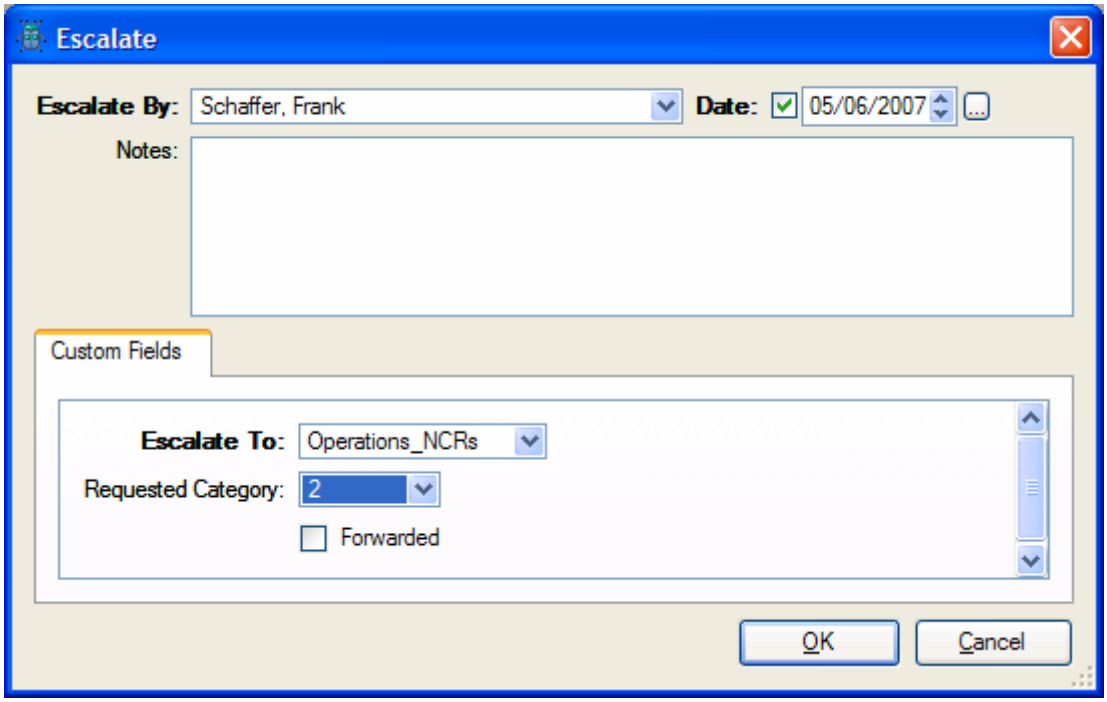


Figure 4.3.6-11. Escalate GUI

Table 4.3.6.10 provides a description of the Escalate screen's fields.

Table 4.3.6-10. Escalate Field Descriptions

Field Name	Data Type	Size	Entry	Description
Escalate By	Selection	32	Required	Who is escalating the problem
Date	Date/Time	n/a	Required	Date Trouble Ticket is escalated
Notes	Text		Optional	Details of how the issue was resolved
Escalate To	Selection	*	Required	Name of target NCR project
Requested Category	Selection	*	Optional	Urgency of the problem
Forwarded	Check box	n/a	System	Whether or not the Trouble Ticket has been forwarded to Landover

***Note**: the size of a field with a "selection" data type can vary and the size is automatically adjusted to the size of the item selected from the selection list.

4.3.6.2.4.6 Close Screen

The Close screen (Figure 4.3.6-12) is used to document that the issue described in the Trouble Ticket has been rejected or abandoned, or that work has been completed. Clicking **OK** on this screen advances the Trouble Ticket to the Closed state.

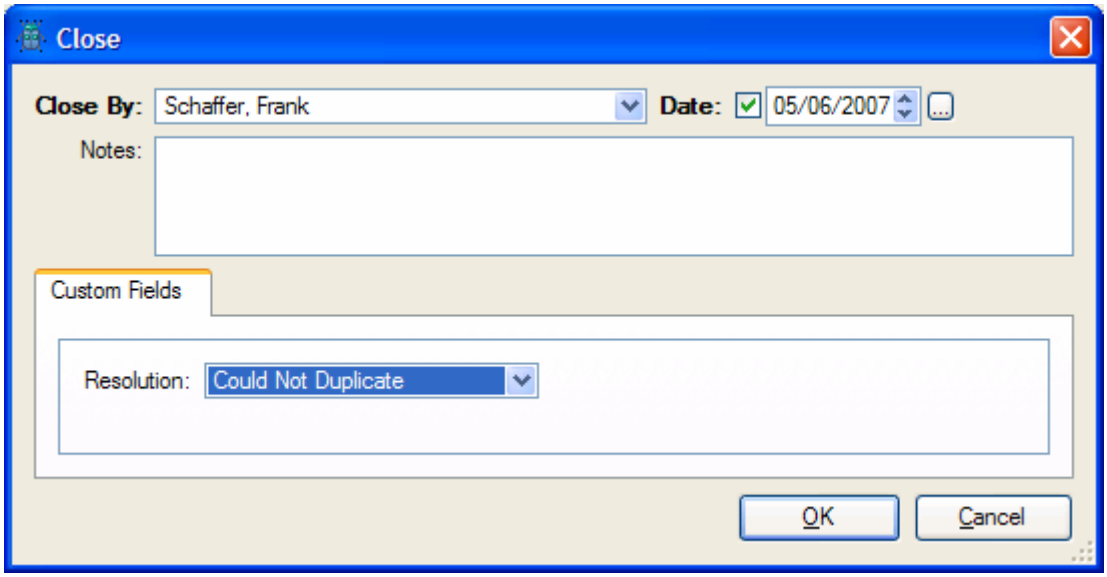


Figure 4.3.6-12. Close GUI

Table 4.3.6.11 provides a description of the Close screen's fields.

Table 4.3.6-11. Close Field Descriptions

Field Name	Data Type	Size	Entry	Description
Close By	Selection	32	Required	Who closed the Trouble Ticket
Date	Date/Time	n/a	Required	Date the Trouble Ticket was closed
Notes	Text		Optional	Supporting information for closing the Trouble Ticket
Resolution	Selection	*	Required	Why the Trouble Ticket can be closed

***Note**: the size of a field with a "selection" data type can vary and the size is automatically adjusted to the size of the item selected from the selection list.

4.3.6.2.4.7 Comment Screen

The Comment screen (Figure 4.3.6-13) is used for recording miscellaneous notes related to the Trouble Ticket. It does not change the ticket's life cycle state.

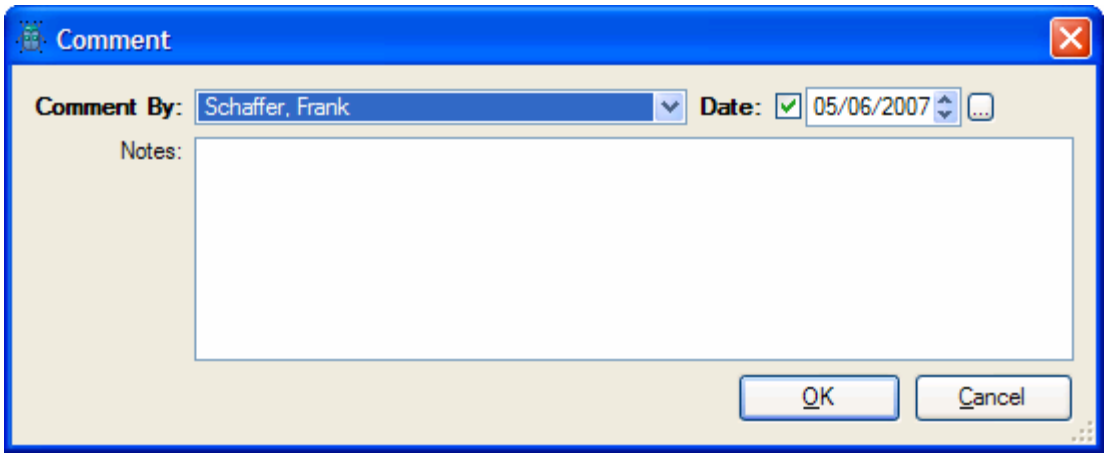


Figure 4.3.6-13. Comment GUI

Table 4.3.6.12 provides a description of the Comment screen's fields.

Table 4.3.6-12. Comment Field Descriptions

Field Name	Data Type	Size	Entry	Description
Comment By	Selection	32	Required	Who is recording the comment
Date	Date/Time	n/a	Required	Date the comment is recorded
Notes	Text		Optional	The comment

***Note**: the size of a field with a "selection" data type can vary and the size is automatically adjusted to the size of the item selected from the selection list.

4.3.6.2.5 Reports Screen

The Reports screen (Figure 4.3.6-14) is used for generating pre-defined and ad hoc Trouble Ticket reports. Four types of reports are possible: list, detail, trend, and distribution. (See Section 4.3.6.8.1 for an example of each.) TTPro uses style sheets as templates for generating reports.

The TestTrack Pro Client Users Guide and the TestTrack Pro Web Users Guide provide details about the subordinate screens used to define new reports, including how to specify or edit stylesheets, page breaks, sort columns, timeframes, totals, and charts.

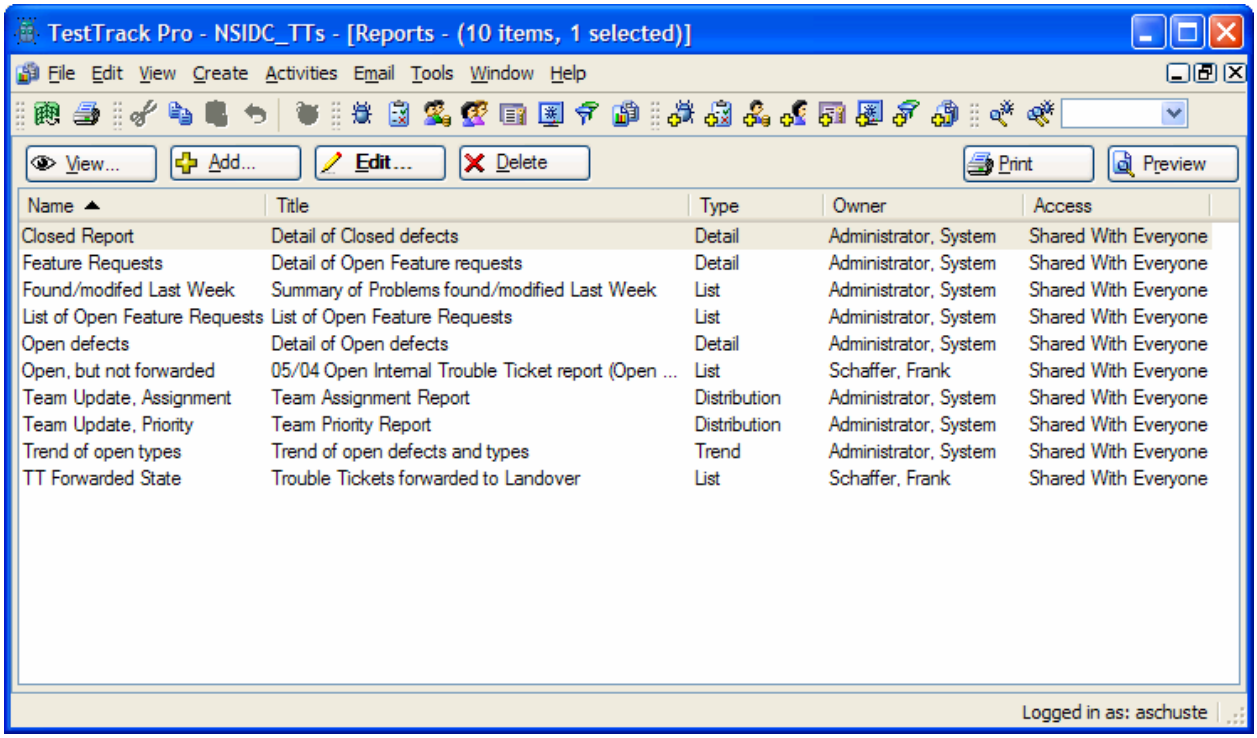


Figure 4.3.6-14. Reports GUI

The Reports screen has the following buttons:

- **View…** Opens a screen for viewing the configuration of the report.
- **Add…** Opens a screen for defining a new report.
- **Edit…** Opens a screen for editing the configuration of a pre-defined report.
- **Delete** Deletes an operator-selected report.
- **Print** Runs the report writes the output to the default printer (Windows client only)
- **Preview** Runs the report and presents it via the operator's default web browser

4.3.6.2.6 Security Groups Screen

The Security Groups screen (Figure 4.3.6-15) is used to manage profiles that define TTPro user roles and the system privileges granted to each role. Each TTPro project has its own set of security groups. Users authorized access to a project must be assigned to one (and only one) security group.

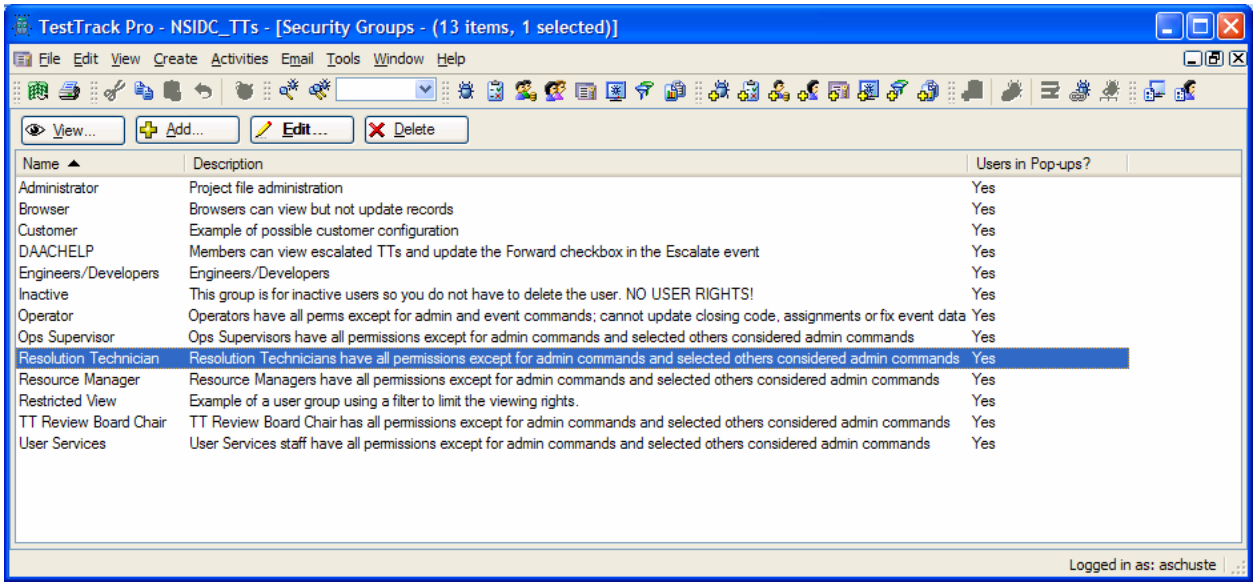


Figure 4.3.6-15. Security Groups GUI

This screen has no data entry fields.

The Security Groups screen has the following buttons:

- **View…** Opens a screen for viewing selected groups' privileges within the project.
- **Add…** Opens a screen for adding a new group and its privileges to the project
- **Edit…** Opens a screen for updating selected groups' privileges within the project
- **Delete** Deletes selected security groups. Users who were members of the deleted group(s) are no longer assigned to any project. They cannot access the project nor receive project-issued e-mail notifications.

See the TestTrack Pro manuals for descriptions of the Add Security Group, Edit Security Group, and View Security Group screens.

4.3.6.2.7 Users Screen

The Users screen (Figure 4.3.6-16) is used to manage profiles that define who can access the project's Trouble Tickets. Double-clicking on one or more users in the list opens either the View User or Edit User screens, depending on the client's user options settings.

Profiles can be global or local. Global user profiles can be shared among all TTPro projects on the network. Local user profiles are known only within the project in which they are defined, but they can be promoted to a global user profile if the user's name is unique among all projects.

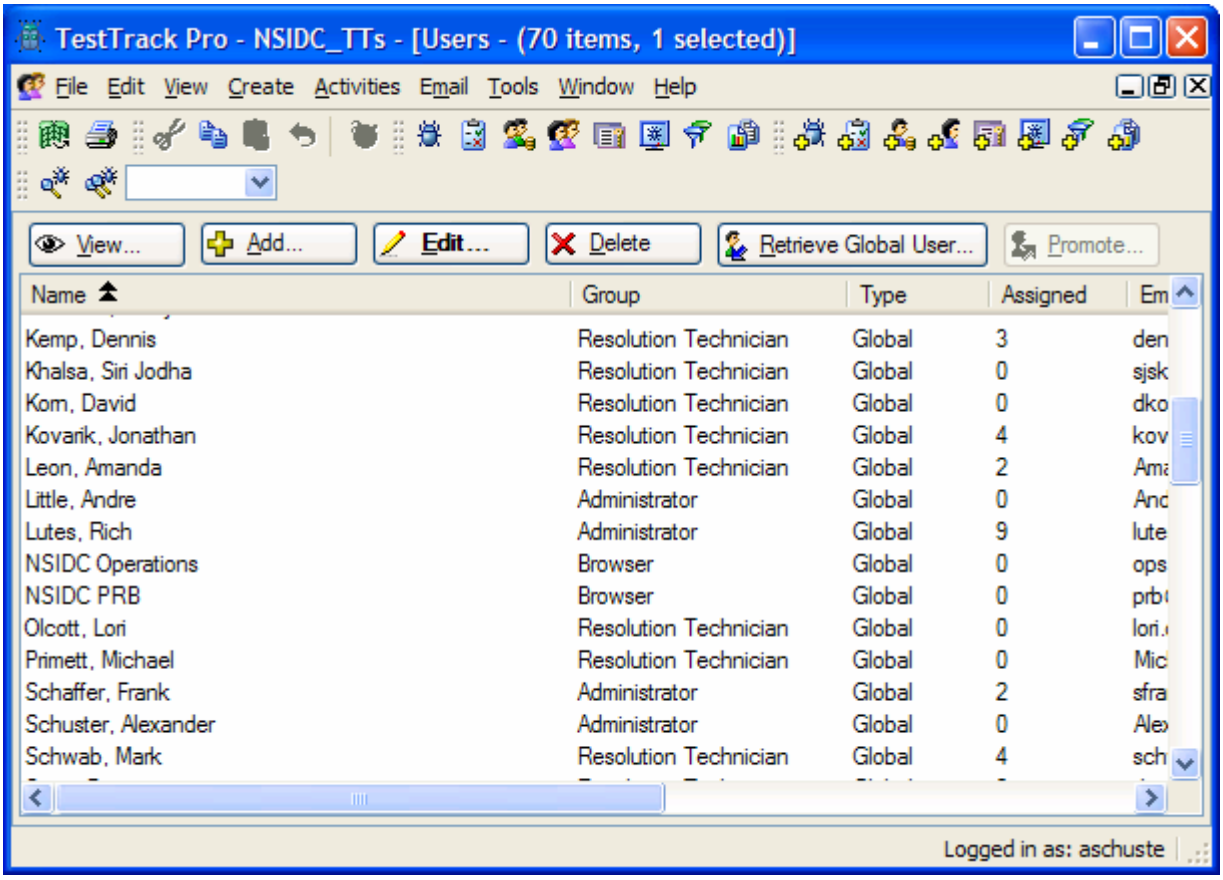


Figure 4.3.6-16. Users GUI

This screen has no data entry fields.

The Users screen has the following buttons:

- **View…** Opens a screen for viewing selected users' profiles within the project.
- **Add…** Opens a screen for adding a new user profile to the project
- **Edit…** Opens a screen for updating selected user profiles within the project
- **Delete** Deletes selected user profiles. Deleting a user removes all references to that user from the project's Trouble Tickets.
- **Retrieve Global User** Adds a user to the project by retrieving the user's profile from the TTPro license server's global user records.
- **Promote** Adds selected, local user profiles to the TTPro license server's global user database.

See the TestTrack Pro manuals for descriptions of the Add User and View User screens. The Edit User screen is described in the next section.

4.3.6.2.8 Edit User Screen

Use the Edit User screen (Figure 4.3.6-17) to update user profiles for the project. Its fields are identical to those of the Add User and View User screens.

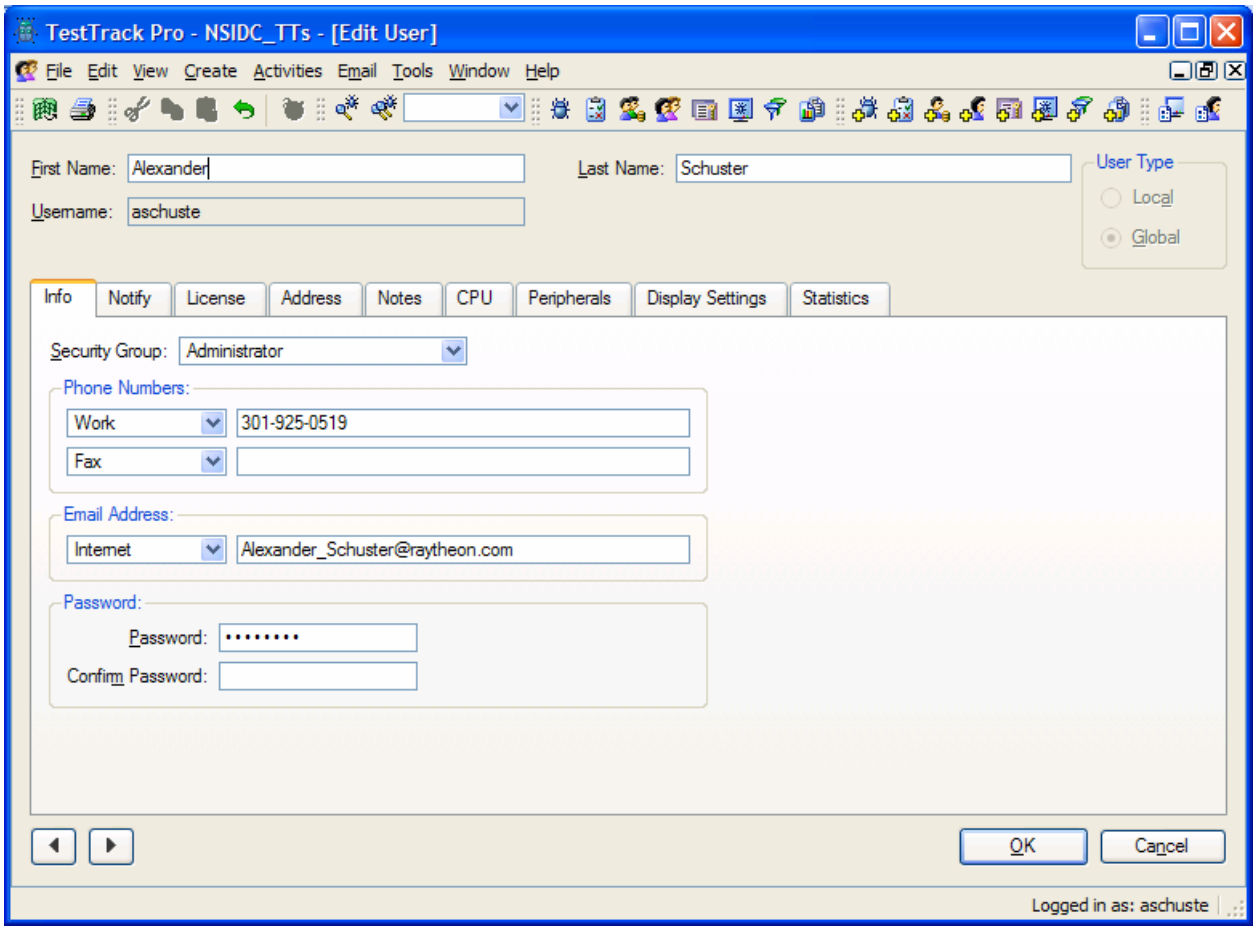


Figure 4.3.6-17. Edit User GUI

Table 4.3.6.13 provides a description of the Edit User screen's fields (Info tab only).

Table 4.3.6-13. Edit User Field Descriptions (Info Tab only)

Field Name	Data Type	Size	Entry	Description
First Name	Character	32	Optional	User's first name
Last Name	Character	32	Optional	User's surname
Usernamee	Character	32	Optional	User's logon IDr
Security Group	Selection	*	Required	User's assigned security group
Phone Number (Type)	Selection	*	Optional	User's phone type (work, home, fax, pager, mobile)
Phone Number (Type)	Selection	*	Optional	User's phone type (work, home, fax, pager, mobile)
Email Address (Type)	Character	32	Optional	User's email type (Internet, MAPI, other).
Email Address	Character	32	Optional	User's e-mail address to use for notifications
Password	Character	n/a	Optional	User's Password
Confirm Password	Character	n/a	Optional	User's Password

***Note**: The size of a field with a "selection" data type can vary and the size is automatically adjusted to the size of the item selected from the selection list.

In addition to the fields described in the above table, the Edit User screen contains the following buttons:

- User Type – designates whether the user is to be registered with the TTPro license server's global user database shared by all projects it services.
- Left/Right Arrows – navigates to the previous and next user profile, respectively.

4.3.6.2.9 Setup <*Field*> Names Screen

The Setup <*Field*> Names screen (Figure 4.3.6-18) is used to pre-define values that can be entered via pull down menus attached to specific TTPro fields. On TTPro's Trouble Ticket screens, clicking the down arrow icon next to any of these fields displays the choices from which a user can select. This screen is reached by clicking Tools → Configure List Values <*field-name*> Values… on the TTPro menu bar.

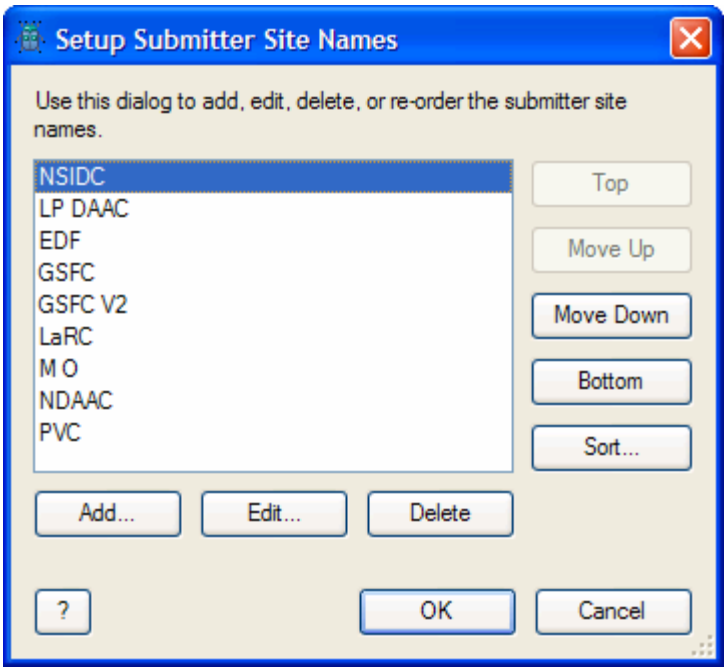


Figure 4.3.6-18. Setup <Field> Name GUI

This screen has no data entry fields.

The Setup <*Field*> Names screen contains the following buttons:

- **Add…** Opens a screen for adding a new value to the pull down menu list.
- **Edit…** Opens a screen for editing the selected value in the pull down menu list.
- **Delete** Deletes the selected value from the pull down menu.
- **Top** Moves the value to the top of the pull down menu's list.
- **Move Up** Move the value one position higher in the pull down menu's list.
- **Move Down** Moves the value one position lower in the pull down menu's list.
- **Bottom** Moves the value to the bottom of the pull down menu's list.

Sort… Sorts the pull down menu's list of values alphabetically, either ascending or descending as specified on a supporting data entry screen.

4.3.6.2.10 Configure System Notification Rules Screen

The Configure System Notification Rules screen (Figure 4.3.6-19) is used for defining the conditions for automatically notifying uses about Trouble Ticket changes. Typically managed by TTPro administrators, notifications can be issued for all or any subset of records, using a pre-defined or a custom e-mail template, to anyone authorized access to the project. This screen is invoked by clicking `Tools` → `Administration` → `System Notification Rules` on TTPro's menu bar.

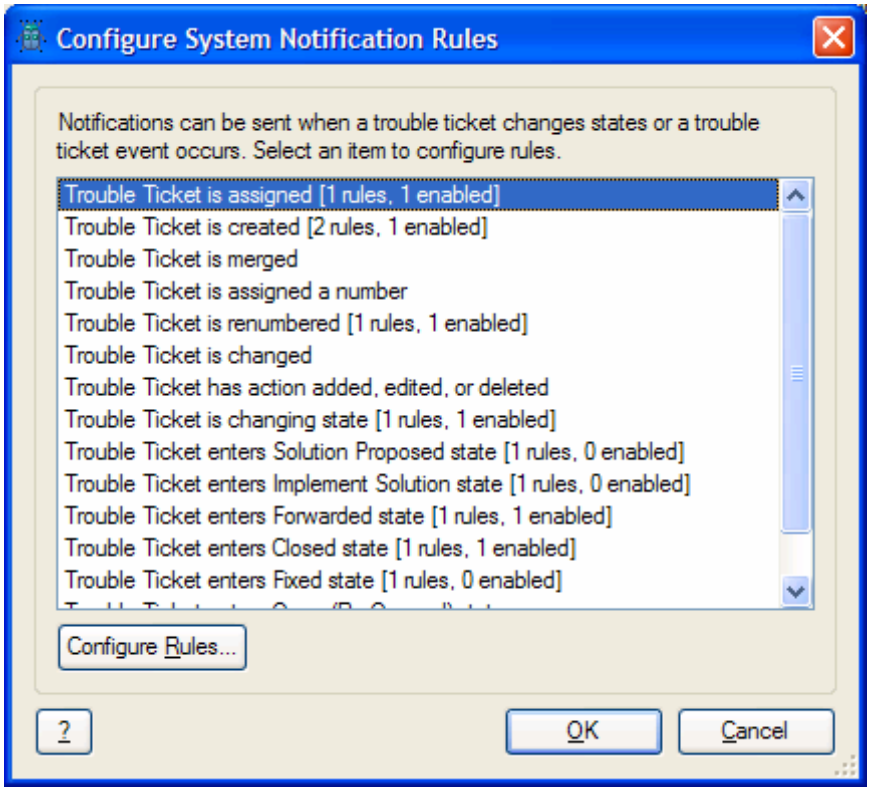


Figure 4.3.6-19. Configure System Notification Rules GUI

This screen has no data entry fields.

The Setup <*Field*> Names screen contains the following unique button:

- **Configure Rules** Opens a screen for adding, editing, activating, and deleting notification rules for the selected Trouble Ticket events. See the TTPro manuals for a description of this screen and how to use it.

4.3.6.2.11 User Options screen

The User Options screen (Figure 4.3.6-20) lets users specify personal preferences about how TTPro behaves. These cover displays, notifications, a personal dictionary, spell checking, and a few, other, more general features. This screen is invoked by clicking `Tools → User Options` on TTPro's menu bar.

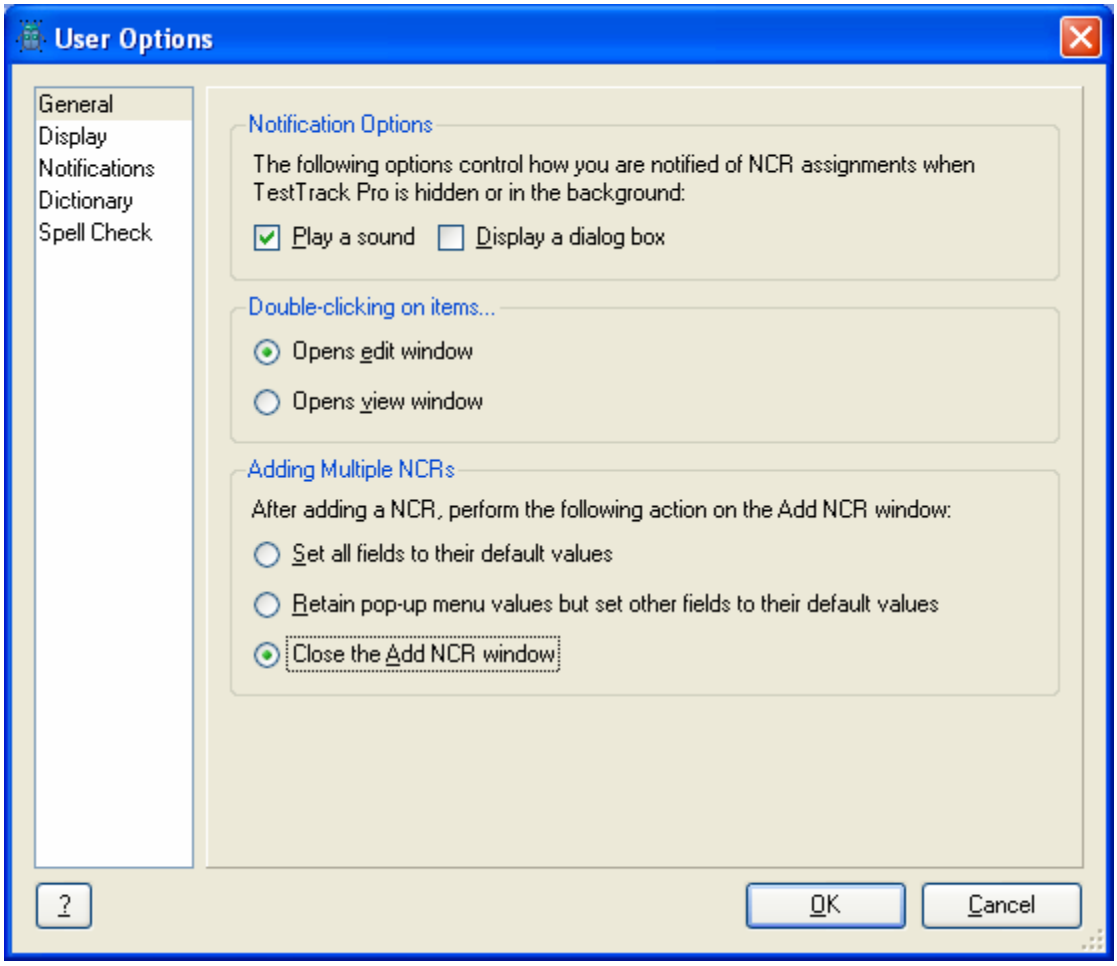


Figure 4.3.6-20. Configure System Notification Rules GUI

Most panes on the screen present a series of radio buttons or check boxes. The Dictionary pane, though, provides a dialog for specifying the main dictionary to be used when spell checking and for adding custom words to the dictionary.

See the TTPro manuals for more details about using this screen.

4.3.6.2.12 License Server Admin Utility

The License Server Admin Utility screen (Figure 4.3.6-21) is the gateway to the collection of screens for managing TTPro license server operations. The GUI can be started only from the command line on the TTPro server machine, and access is generally limited to central TTPro system administrators.

Start the utility by typing: **<*TTPro-root*>/splicsvr/bin &** .

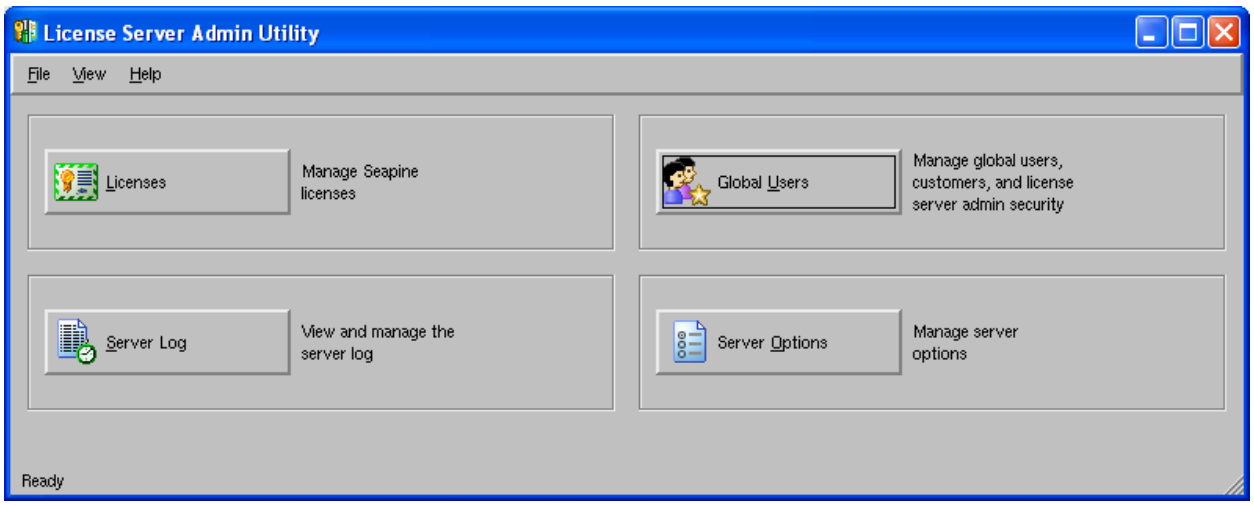


Figure 4.3.6-21. License Server Admin Utility Screen

This screen has no data entry fields.

The License Server Admin Utility screen contains the following unique buttons:

- **Licenses** Opens a screen for adding, editing, and deleting TTPro licenses, as well as for associating users with single-user, "named" licenses when applicable. From this screen, administrators can navigate to the Floating Licenses Used screen to view who is currently using TTPro floating licenses network-wide.
- **Global Users** Opens a screen for adding, editing, and deleting user profiles. See Section 4.3.6.2.13, Global Users Screen, below.
- **Server Log** Opens a screen for viewing, filtering, deleting and exporting license server log entries.
- **Server Options** Opens a screen for configuring log, license server, server database, LDAP, and password options. Password options cover requirements, restrictions and history.

See the Seapine License Server Admin Utility Guide, Version 3.1, for a thorough description of the screens mentioned above.

4.3.6.2.13 Global Users Screen

The Global Users screen (Figure 4.3.6-22) lets TTPro administrators manage the user profiles of individuals who need to access to more than one TTPro project on the network. Double-clicking on any row in the list opens an Edit User screen containing the profile for the selected user. (See Section 4.3.6.2.8) This screen is invoked by clicking on the Global Users button on the License Server Admin Utility GUI. (See Section 4.3.6.2.12)

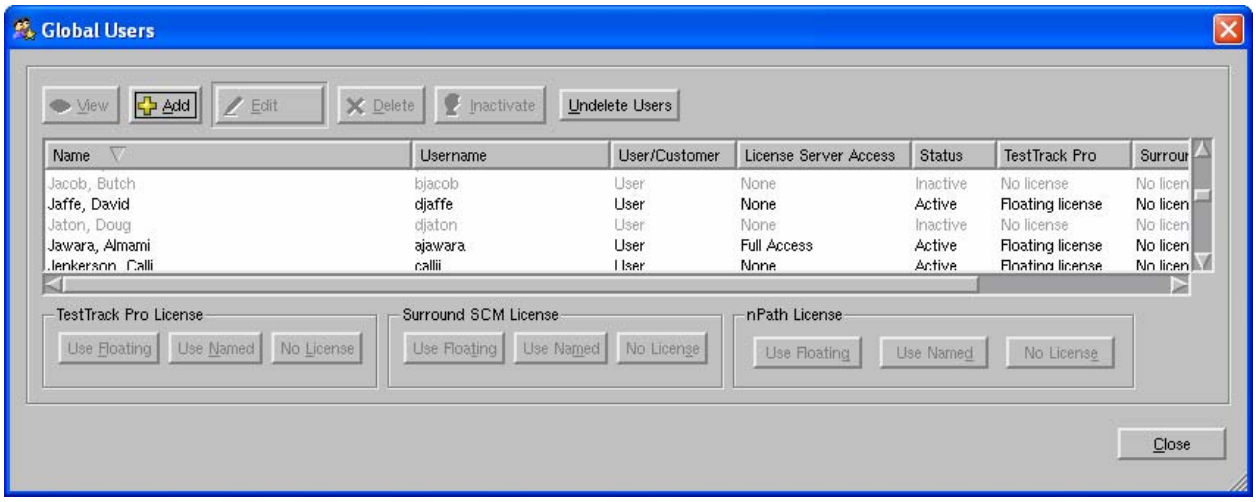


Figure 4.3.6-22. Global Users GUI

This screen has no data entry fields.

See the Seapine License Server Admin Utility Guide, Version 3.1, for a thorough description of the screens mentioned above.

4.3.6.2.14 TestTrack Pro Web Client's Trouble Ticket Screen

TestTrack Pro has a Web client that has all the features of the Windows client, including submission, querying, and modification of Trouble Tickets via an Internet Explorer 6.0 or higher, Netscape 7.0 or higher, or Firefox 2.0 or higher Web browsers. To reach the Web client, start the browser and enter the appropriate secure URL and port number. For example: https://<*host*>.gsfc.nasa.gov:<*port_number*>. The TTPro login window is then displayed as shown in Figure 4.3.6-23.

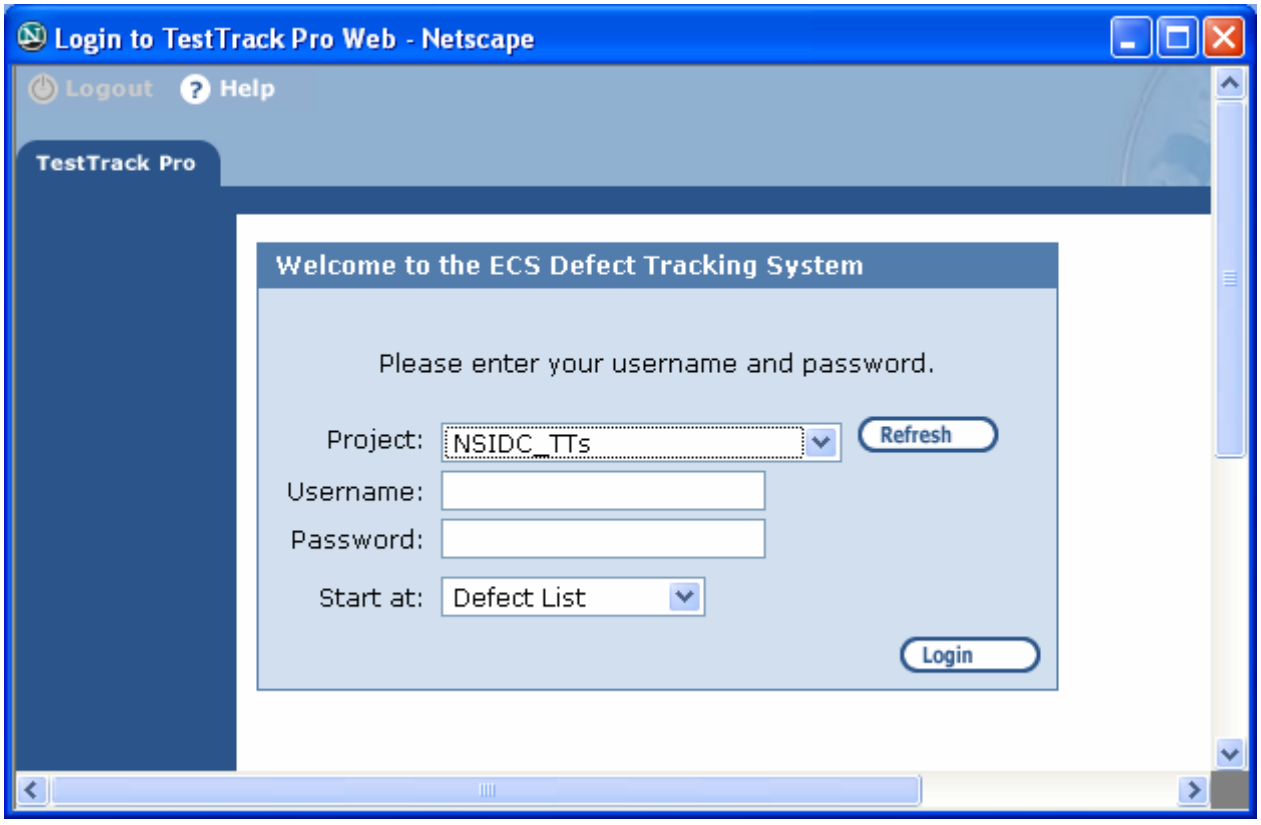


Figure 4.3.6-23. TTPro 7.5.4 Web Login Window

Enter your Username and Password and then click **Login**. After login, the Trouble Tickets List page is displayed as shown in Figure 4.3.6-24. As with the Windows client, the Trouble Tickets list page identifies all Trouble Tickets returned by the filter the user selects. Rather than a menu bar, however, the web page has tabs and a series of action links on the left side of the page to help users navigate and perform actions. To access a Trouble Ticket, users must select (click on) one or more Trouble Tickets, then click the View, Edit, or Delete buttons. A Logout button closes the user's connection to the database properly and frees the user's license.

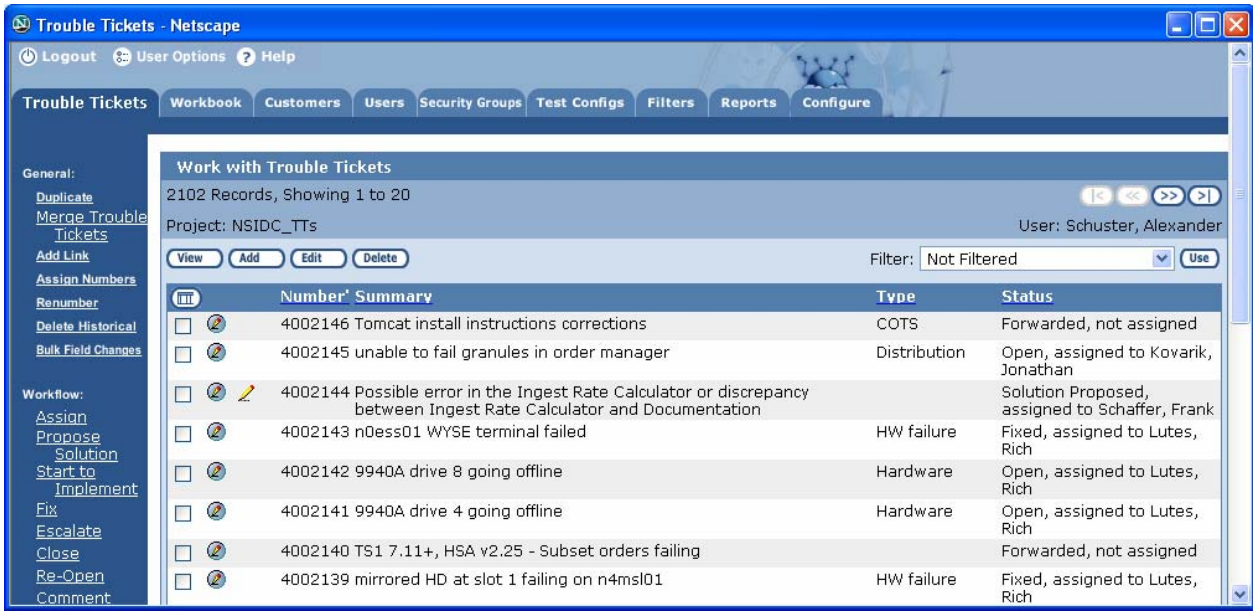


Figure 4.3.6-24. TTPro 7.5.4 Web Login Window

4.3.6.3 Required Operating Environment

The TTPro 7.5.4 server runs on a Linux-based server; clients are Linux-, Windows-, and Web-based. Appropriate information on operating environments, tunable parameters, environment variables, and a list of vendor documentation can be found in the Release Notes document 914-TDA-366. The Release Notes document and the vendor manuals are distributed with TTPro.

4.3.6.3.1 Interfaces and Data Types

TTPro's Trouble Tickets are escalated into NCRs. Table 4.3.6-14 identifies this interface.

Table 4.3.6-14. External Interface Protocols

Interface (facility)	Type of Primary Interface Protocols	Type of Backup Interface Protocols	Comments
tt2ncr	SOAP	Manual	Escalation of Trouble Tickets into NCRs

4.3.6.4 Databases

TTPro uses a native database management system bundled with the product. A distinct Trouble Ticketing database, also known as a project, exists for each ECS site. The Trouble Ticketing databases are:

- GSFC_TTs
- LaRC_TTs
- LPDAAC_TTs
- NSIDC_TTs

4.3.6.5 Special Constraints

Note that while most TTPro screens are accessible to all operators, only TTPro administrators have permissions to modify user permissions, security groups, project workflow, dropdown lists, and system notifications. Privileges are set according to DAAC policy.

4.3.6.6 Outputs

Client output from TestTrack Pro (other than that displayed on GUIs) consists primarily of reports in HTML format presented on demand via the operator's browser of choice. These operator-configurable reports can be printed or saved to a file. See Section 4.3.6.8 for a description of the variety of reports available.

TTPro also issues prompts when operator input is required, and writes a variety of error and informational messages to project and license server logs (see Section 4.3.6.7). Using the Server Options screen of the TestTrack Pro Server Admin Utility and the Seapine License Server Admin Utility, TTPro administrators can control the amount of logging performed.

Users may also export selected TTPro records in either XML or tab- or comma-delimited text format. This is done via GUIs accessible by clicking `File → Export → XML File Export` or `File → Export → Text File Export` on the Trouble Ticket List screen's menu bar.

4.3.6.7 Event and Error Messages

TestTrack Pro does not have an error message guide. Below, however, is a sampling of the information typically logged by TTPro. (See Tables 4.3.6-15 through 4.3.6-17.)

Table 4.3.6-15. TTPro Startup.log File Messages Example

```
Wed 23 May 2007 08:15:58 PM EDT <Activity> Attempting to login as "aschuste"
to the Development_NCRs project using the native client from
[123.456.789.123] failed due to an invalid password.
    DbDir=Development_NCRs
    UserName=aschuste
```

Table 4.3.6-16. TestTrack Pro Server Admin Utility Log File Messages Example

```
5/9/2007 10:00:11 AM    Unusual Activity  0     A user logging into the
project from [127.0.0.1] is required to change their password.
      /usr/ecs/OPS/COTS/ttpro754/TTServDb/TTDbs/Landover_TTs/     forward1
5/9/2007 10:01:57 AM    Unusual Activity  0     ThreadMgr attempted to kill
an inactive thread -847086672 for client at [123.456.789.123].
;           <unknown client>
```

Table 4.3.6-17. License Server Admin Utility Log File Messages Examples

```
06/07/2006 10:02:36 AM  Information     0       Server log startup for
Seapine License Server 3.3.2 Build 2 (Linux)
06/19/2006 01:44:56 PM  Error   0       Socket error when reading request
from [155.157.31.227]: -188195920 ; Socket closed.   Aschuste
05/11/2007 01:40:06 PM  Error   0       Socket error when reading request
from [155.157.33.20]: -250696784 ; Unrecognized Buffer Format.       Server
Session Not Logged In
05/15/2007 01:12:15 AM  Error   0       Error polling on socket from client
at [155.157.33.20] POLLHUP - Hang up.      <not logged in>
```

4.3.6.8 Reports

TTPro can produce detail, list, distribution, and trend reports. Table 4.3.6-18 describes a sample of each.

Table 4.3.6-18. Reports

Report Type	Report Description	When and Why Used
Detail of Open Defects	A full report of every Trouble Ticket not in a Closed state, sorted by Trouble Ticket number (see Figure 4.3.6-25).	When and if someone wants a copy of all open Trouble Tickets.
Summary of Problems	A list of the Trouble Tickets found or modified during the week prior to the report, containing only key details and sorted by Trouble Ticket number (see Figure 4.3.6-26).	When and if someone wants a list of the Trouble Tickets opened or updated during the past week.
Team Assignment Report	A distribution report identifying the Trouble Tickets found or modified during the week prior to the report, containing only key details and sorted by Trouble Ticket number (see Figure 4.3.6-27).	When and if someone wants to know how evenly work is distributed among the staff.
Trend of Open Defects and Types	A trend report identifying the number of Trouble Tickets of each problem type in the Open state over time, grouped and ordered by month (see Figure 4.3.6-28).	When and if someone wants to review (or forecast) trends among the types of problems reported.

4.3.6.8.1 Sample Reports

Figures 4.3.6-25 through 4.3.6-28 provide samples of the reports described in Table 4.3.6-15

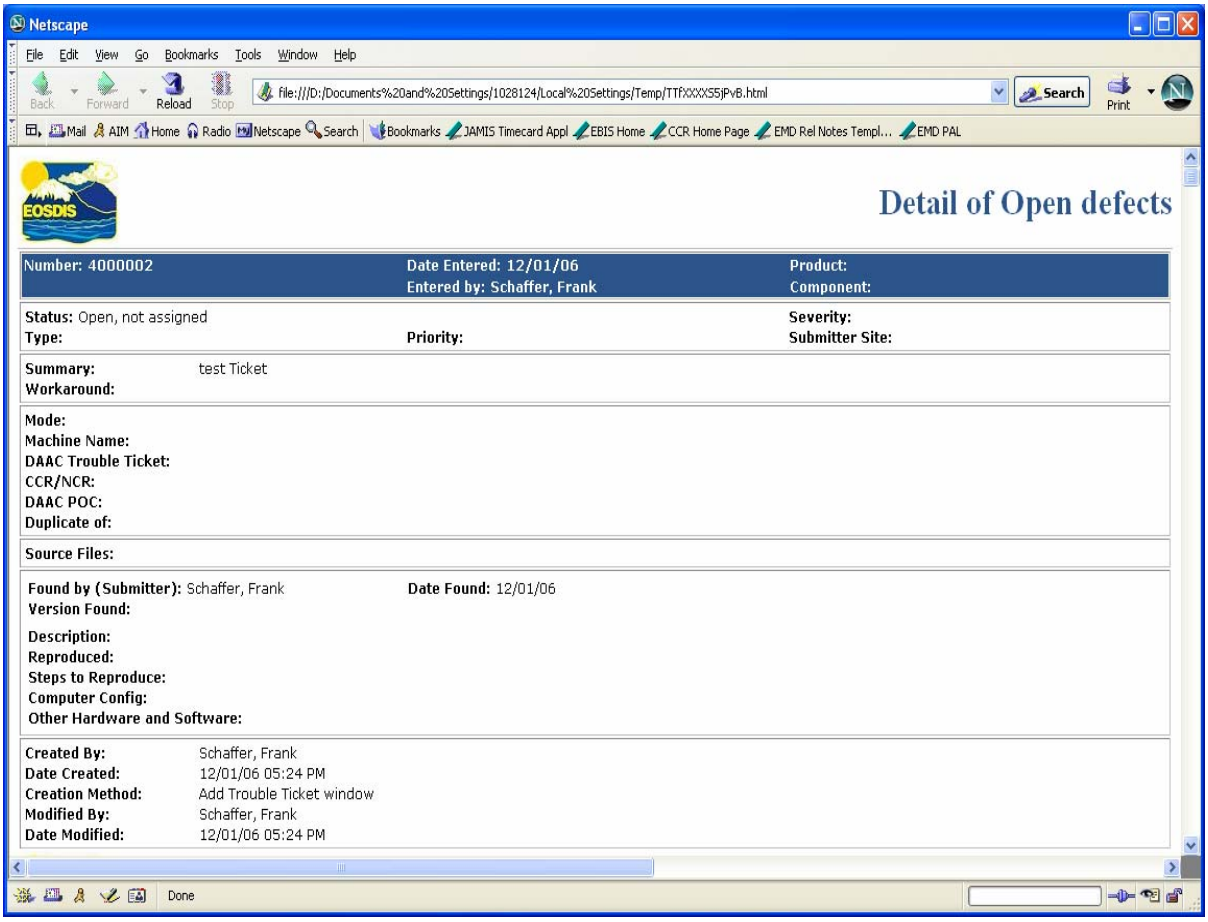


Figure 4.3.6-25. Detail of Open Defects Report

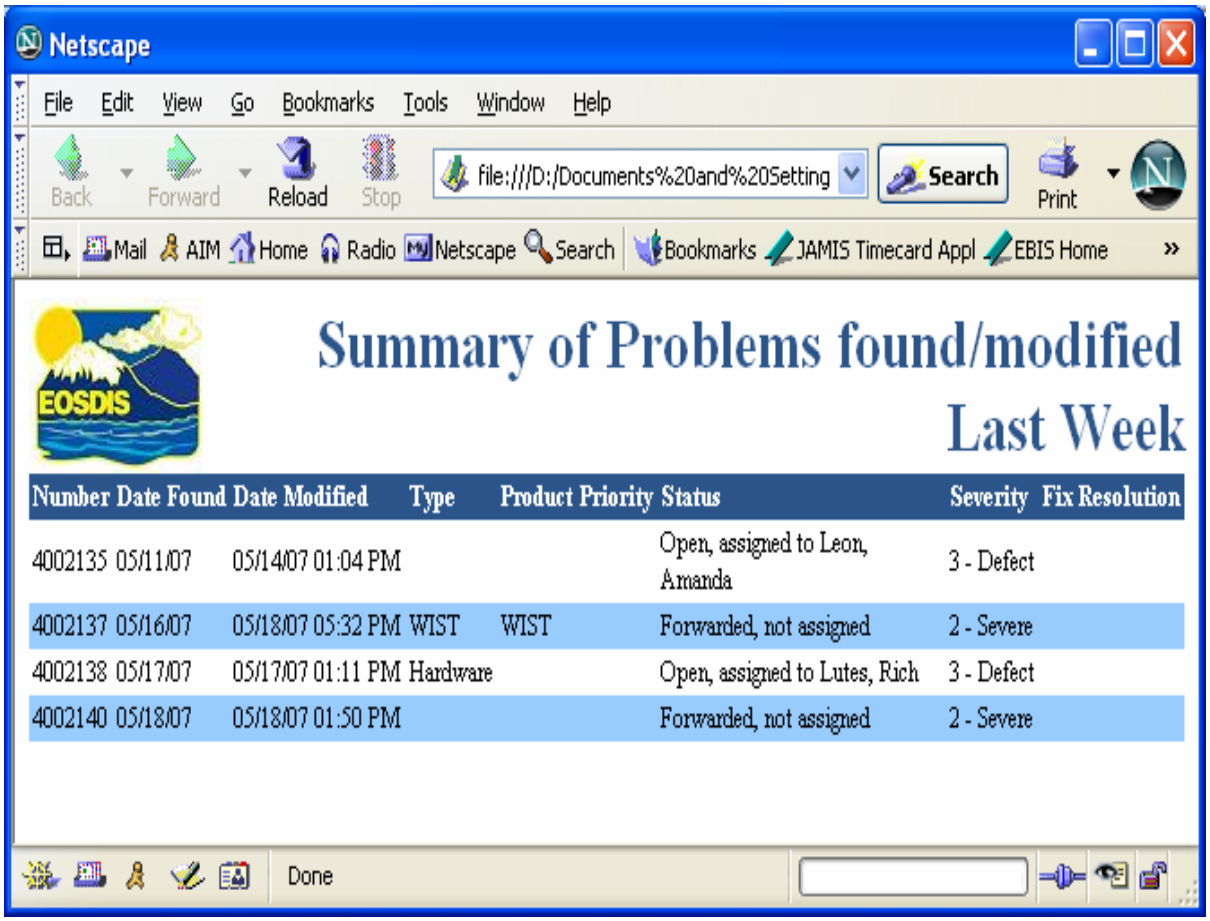


Figure 4.3.6-26. Summary of Problems found/modified Last Week Report

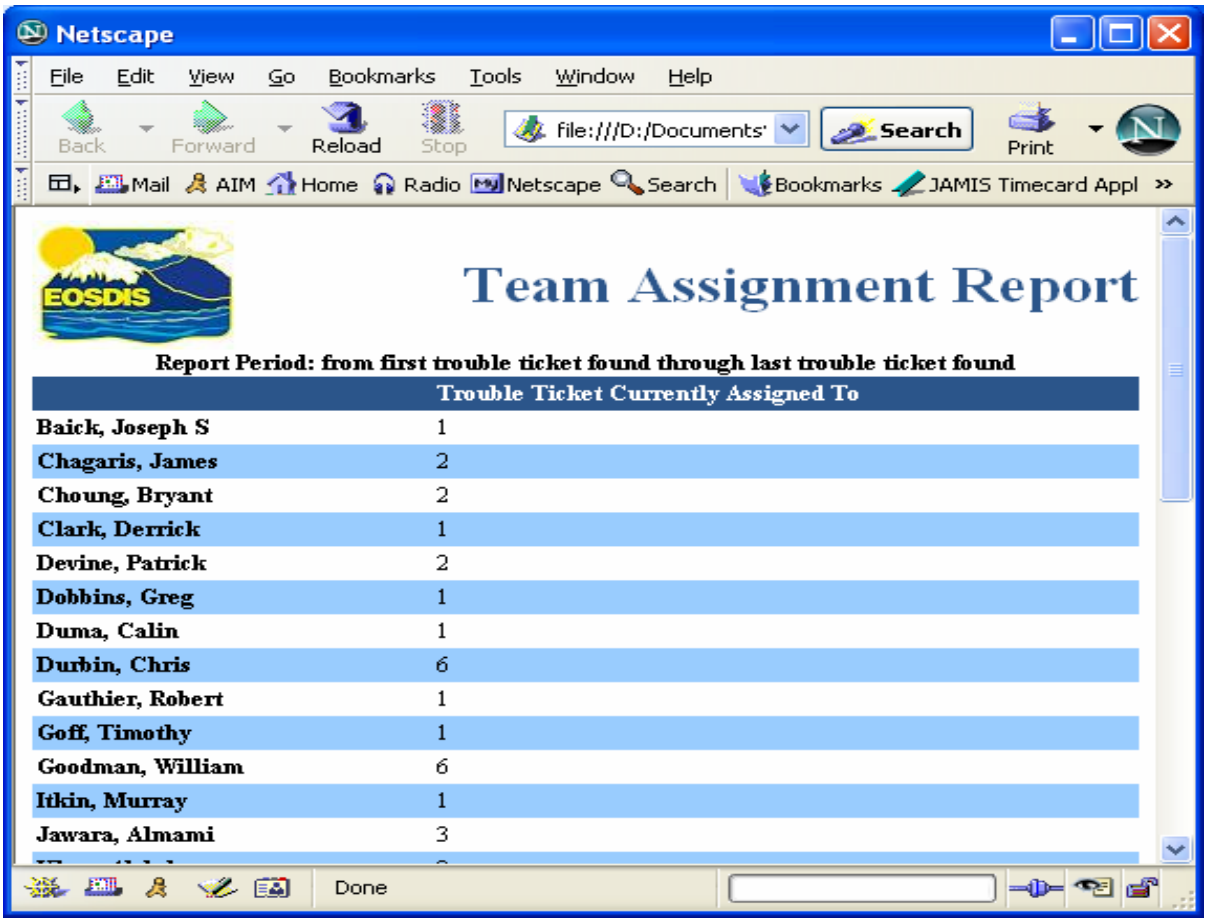
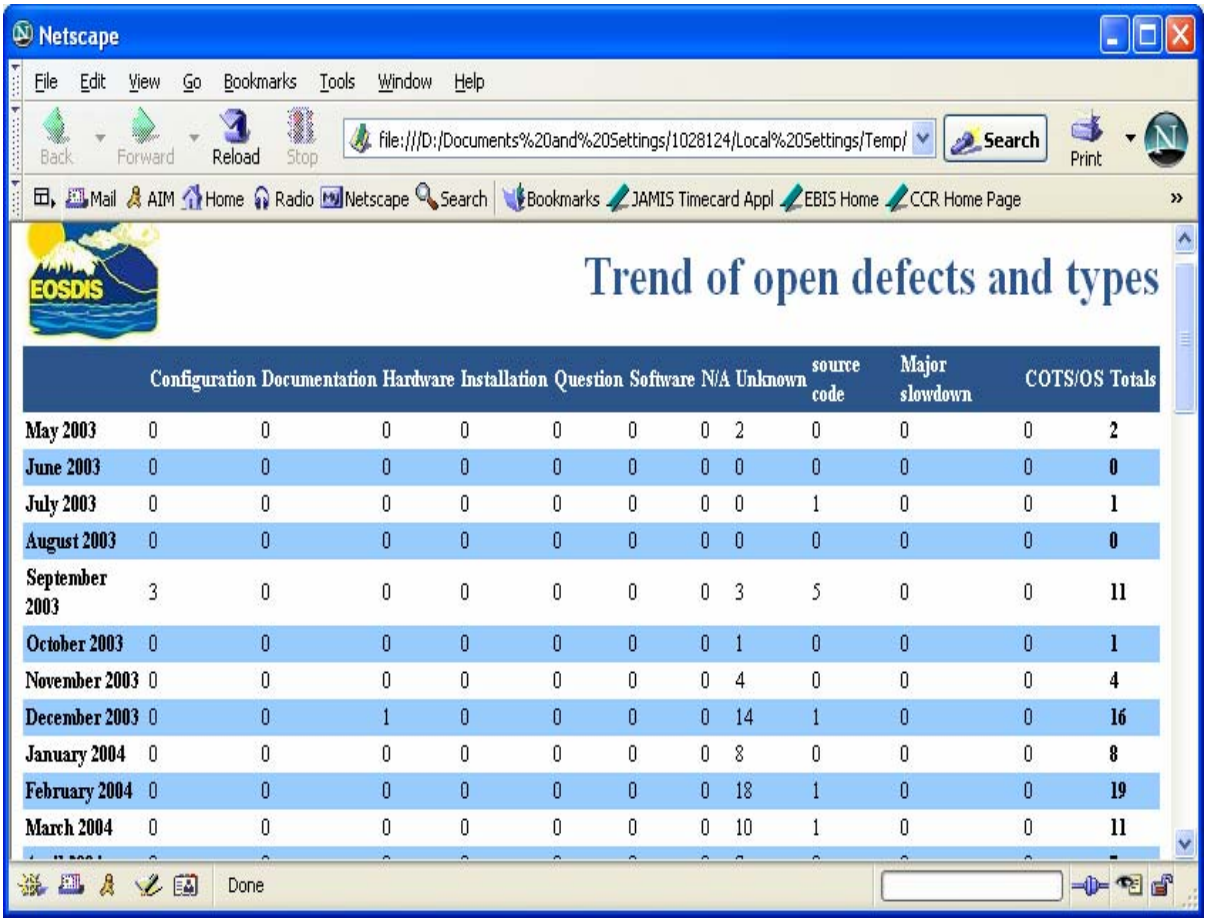


Figure 4.3.6-27. Number of Tickets by Submitter Report



	Configuration	Documentation	Hardware	Installation	Question	Software	N/A	Unknown	source code	Major slowdown	COTS/OS	Totals
May 2003	0	0	0	0	0	0	0	2	0	0	0	2
June 2003	0	0	0	0	0	0	0	0	0	0	0	0
July 2003	0	0	0	0	0	0	0	0	1	0	0	1
August 2003	0	0	0	0	0	0	0	0	0	0	0	0
September 2003	3	0	0	0	0	0	0	3	5	0	0	11
October 2003	0	0	0	0	0	0	0	1	0	0	0	1
November 2003	0	0	0	0	0	0	0	4	0	0	0	4
December 2003	0	0	1	0	0	0	0	14	1	0	0	16
January 2004	0	0	0	0	0	0	0	8	0	0	0	8
February 2004	0	0	0	0	0	0	0	18	1	0	0	19
March 2004	0	0	0	0	0	0	0	10	1	0	0	11

Figure 4.3.6-28. Trend of Open Defects and Types Report

4.3.6.8.2 Report Customization

Reference the TestTrack Pro Client User Manual or TestTrack Pro Web User Manual for information on creating and customizing reports. The manuals are installed along with the product. They can be accessed separately or by selecting Help on any TTPro screen.

4.4 Security and Accountability

This section describes the security and accountability tools used by DAAC operators:

1. TCP Wrappers
2. Tripwire
3. Cryptographic Management Interface (CMI)

This page intentionally left blank.

4.4.1 TCP Wrappers

TCP Wrappers allow the operator to control access to various network services through the use of access control lists. They also provide logging information of wrapped network services, which can be used to prevent or monitor network attacks. It intercepts incoming network connections and verifies if the connection is allowed before passing the connection onto the actual network daemon. TCP Wrappers allows the operator to monitor and filter incoming requests for the systat, finger, ftp, telnet, rlogin, rsh, exec, tftp, talk, and other network services. Full descriptions of these Unix services can be obtained using the "man" command, e.g., man systat. TCP Wrappers perform the following functions automatically:

- **Access control**: access can be controlled per host, per service, or combinations thereof.
- **Host name spoofing**: verifies the client host name that is returned by the address->name DNS server, by asking for a second opinion from a local DNS server.
- **Host address spoofing**: the wrapper programs can give additional protection against hosts that claim to have an address that lies outside their own network.
- **Client username lookups**: the protocol proposed in RFC 931 provides a means to obtain the client user name from the client host. The requirement is that the client host runs an RFC 931-compliant daemon. The information provided by such a daemon is not used for authentication purposes but it can provide additional information about the owner of a TCP connection.
- **Multiple ftp/gopher/www archives on one host**: `daemon@host' access control patterns can be used to distinguish requests by the network address that they are aimed at. Judicious use of the `twist' option (see the hosts_options.5 file supplied with TCP Wrappers, `nroff -man' format) can guide the requests to the right server. These can be servers that live in separate chroot areas, or servers modified to take additional context from the command line, or a combination.
- **Sequence number guessing**: client username lookup protocol can help to detect host impersonation attacks. Before accepting a client request, the wrappers can query the client's IDENT server and find out that the client never sent that request.

Additional information on TCP Wrappers can be obtained at the following URL:

http://www.alw.nih.gov/Security/prog-firewall.html

TCP Wrappers is used to perform the operator functions listed in Table 4.4.1-1.

Table 4.4.1-1. Common EMD Operator Functions Performed with TCP Wrappers

Operating Function	Command/Action	Description	When and Why to Use
Monitor potentially malicious attempts to access network services.	Check TCP Wrappers log using a text editor.	Program continuously runs in the background appearing to malicious external client service requests as a normal inetd daemon process.	To check for evidence of an attempt of breaking-in.

4.4.1.1 Quick Start Using TCP Wrappers

TCP Wrappers provides a library of tiny daemon wrapper programs. The daemons each correspond to a service provided by the host operating system. The daemons are registered with the service, which results in the operating system invoking the daemon each time that service is invoked. The daemons perform their function(s) and terminate. A common function is to log the name of the client host and requested service. They do not exchange information with client or server applications, and impose no overhead on the actual conversation between the client and server applications. Optional features include: access control to restrict what systems can connect to what network daemons; client user name lookups with the RFC 931 protocol; additional protection against hosts that pretend to have someone else's host name; and additional protection against hosts that pretend to have someone else's host address.

4.4.1.1.1 Command Line Interface

The TCP Wrappers cannot be invoked or accessed from the command line. The TCP Wrapper daemons are invoked by the operating system service to which they are registered. The daemons terminate upon completing their function.

4.4.1.2 TCP Wrapper Main Screen

TCP Wrapper does not have a graphical user interface.

4.4.1.3 Required Operating Environment

For all COTS packages, appropriate information on operating environments, tunable parameters, environment variables, and a list of vendor documentation can be found in a CM controlled document for each product.

4.4.1.4 Databases

None.

4.4.1.5 Special Constraints

None.

4.4.1.6 Outputs

Table 4.4.1-2 describes TCP Wrappers output.

Table 4.4.1-2. TCP Wrapper Outputs

Output	Disposition	Description and Format
Event log	The disposition of the wrapper logs is determined by the system configuration file parameter for the system log file name. In the ECS Release 4 Development Environment (host = mss1) the parameter is local3.info and the log file is /etc/syslog.conf.	The Wrapper daemons log the event/service request that caused their invocation. The log provides sufficient information to describe the event/service request and response from the system. Log records are output in ASCII text format, each record containing the following fields: Date Time host Service Response to request Event

Figure 4.4.1.1 shows an example of a log file created by TCP Wrappers. The log file can be examined with available tools like the **vi** editor. The contents of the log file can be used to generate reports on Service Request activity for the host.

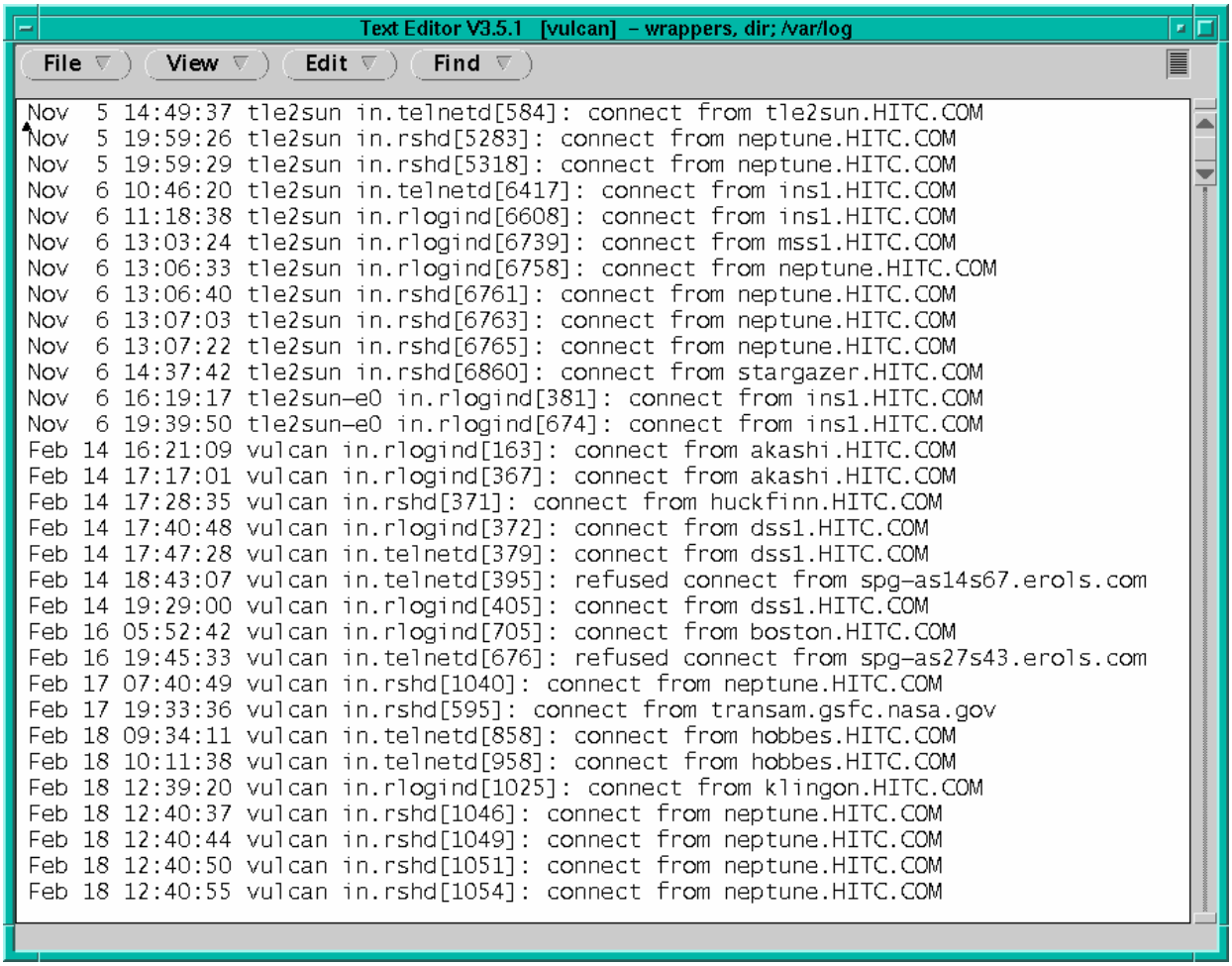


Figure 4.4.1-1. Example of TCP Wrappers Log

The log file provides the following information for each entry: data and time; host sever name; type of service requested and port that provides that service; answer given to the request connection (connect/refused); client host name.

4.4.1.7 Event and Error Messages

None.

4.4.1.8 Reports

None.

4.4.2 Tripwire

Tripwire is an intrusion detection tool that aids system administrators and users in monitoring a designated set of files for any changes. File systems may be altered without authorization in a number of ways, including an intruder, an authorized user violating a DAAC policy, or malicious code-altering system executables as others are run. Using Tripwire, unauthorized changes are tracked in a very short amount of time.

Tripwire automates the creation of input lists and output lists of files. Tripwire uses the file tw.config to maintain the list of tested files. File attributes such as file size, ownership, inode number, inode values and timestamps are compared between the input and output lists. For each file, Tripwire computes a digital signature, which is a fixed-sized output generated by a signature function whose input is an arbitrary file. If the contents of a file are changed in any way, the signature also changes. One of the signature functions is to test for the integrity of a file system by generating checksums of files and comparing them with a previously generated database of checksums. Added or deleted files are flagged and reported, as are any files changed from their previously recorded state in the database. When run against system files on a regular basis, any file changes would be spotted when Tripwire is next run, giving system administrators information to enact damage control measures immediately.

Tripwire uses message-digest algorithms (one-way hash functions) to detect changes in a hard-to-spoof manner. This detects significant changes to critical files, including those caused by insertion of backdoor traps or viruses. Tripwire also monitors changes to file permissions, modification times, and other significant changes to inodes as selected by the system administrator on a per file/directory basis. Tripwire performs the following functions automatically:

- **Database Generation** -- Tripwire initializes the database based upon the entries enumerated in the tw.config file.
- **Database Update** -- Provides incremental database update functionality on a per-file/directory basis. This obviates having to regenerate the entire database every time a file or set of files change.
- **Integrity Checking** -- Generates a report of added, deleted, or changed files, comparing all the files described by the tw.config file against the files residing on the file system.
- **Interactive Update** -- Reports added, deleted, and changed files and prompts the user whether those database entries should be updated. The Interactive Update provides a method for system administrators to keep Tripwire databases ``in sync'' with file systems that change.

Tripwire is used to perform the operator functions listed in Table 4.4.2-1.

Table 4.4.2-1. Common EMD Operator Functions Performed

Operating Function	Command	Description	When and Why to Use
Change the configuration file.	Edit the specific configuration file using the vi editor.	Specify which file(s) should be monitored.	When another file needs to be monitored. Checks the integrity of the file system specified when the daemon is started.
Compare file signatures with database.	Done by Tripwire "cron" run periodically.	Compares files' current signatures against the database and emails the operator a notification for changed files.	This activity is a continuous, periodic performed on a configured interval by the "cron" run.
Update the signatures data store.	Done manually in response to "Interactive Update" prompts.	Updates the signature data store when the email notification discloses legitimate changes.	As necessary to maintain a valid data store of signatures.

4.4.2.1 Quick Start Using Tripwire

The following command is used to execute Tripwire from the command line prompt (as root):

/etc/tripwire/src/tripwire -v > {filename}

The following is the general syntax of executing Tripwire

*tripwire [**options** ...] >**filename***

Where ***options*** are:

-initialize	Database Generation mode -init
-update entry	update entry (a file, directory, or tw.config entry) in the database
-interactive	Integrity Checking mode with interactive entry updating
-loosedir	use looser checking rules for directories
-d dbasefile	read in database from dbasefile (use `-d -' to read from stdin)
-c configfile	read in config file from configfile (use `-c -' to read from stdin)
-cfd fd	read in config file from specified fd
-dfd fd	read in the database file from specified fd
-Dvar=value	define a tw.config variable (ala @@define)
-Uvar	undefine a tw.config variable (ala @@undef)
-i # or –i all	ignore the specified signature (to reduce execution time)
-q	quiet mode
-v	verbose mode
-preprocess	print out preprocessed configuration file
-E	save as -preprocess
-help	print out interpretation help message
-version	print version and patch information

filename is a complete filename (including path) for the output report file.

Tripwire is automatically invoked on all machines by a “cron” run, which periodically executes Tripwire. The operator receives information from Tripwire by email for files whose current signature does not match the datastore signature. The operator must verify the file changes and update the datastore or report a security violation. Tripwire may be run manually to update the datastore or create reports. The Operator can also generate Tripwire reports via the command line.

The differences between the behaviors of Tripwire started from the “Cron” run and started by the operator result from the use of appropriate parameters on the start command. These parameters are listed and explained below.

4.4.2.2 Tripwire Main Screen

Tripwire does not have a GUI. An example of the Tripwire startup message is shown in Figure 4.4.2-1.

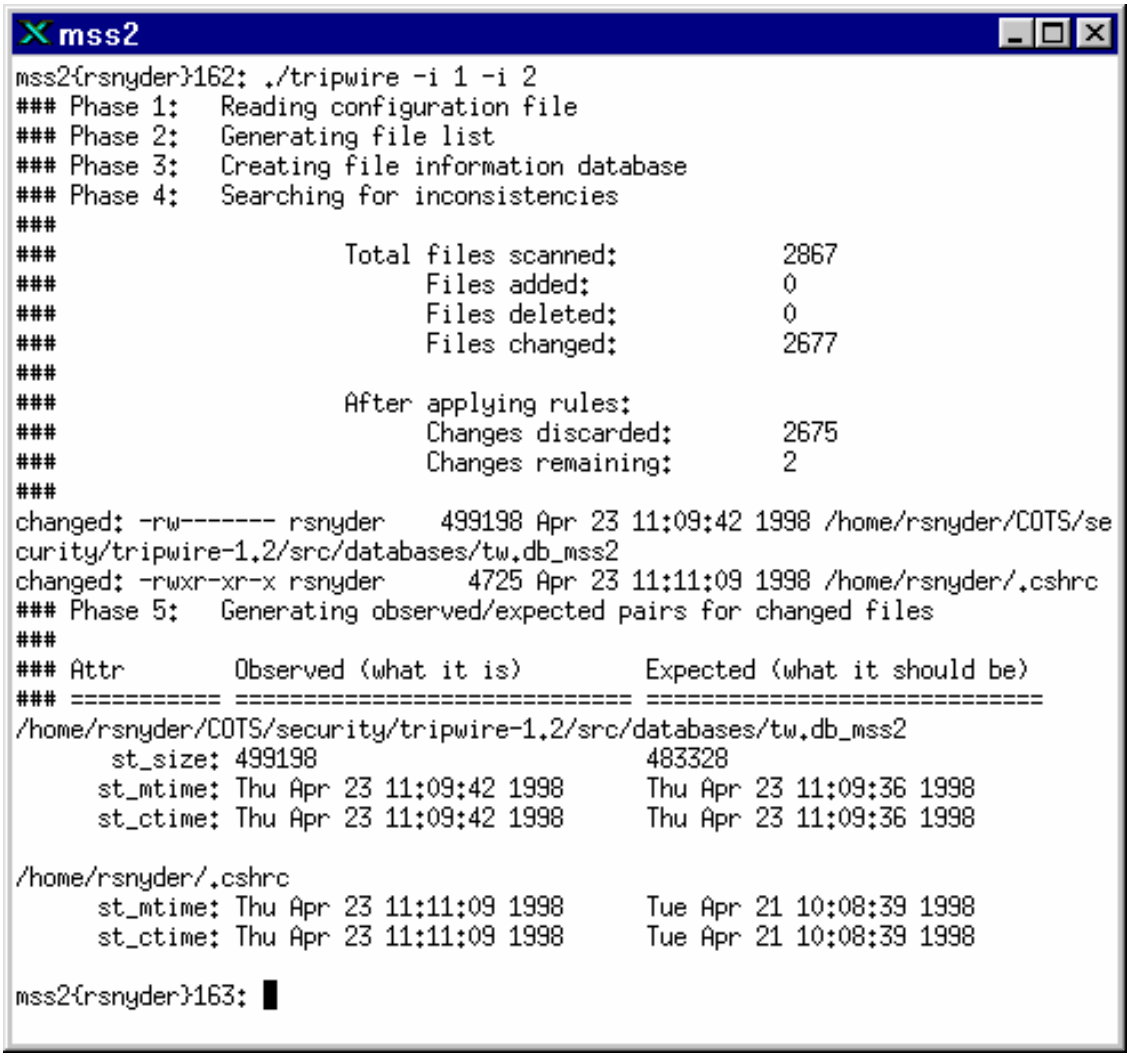


Figure 4.4.2-1. Xterm Window with Tripwire Showing Tripwire Startup Message (example)

4.4.2.3 Required Operating Environment

Tripwire runs on all Linux hosts.

For all COTS packages, appropriate information on operating environments, tunable parameters, environment variables, and a list of vendor documentation can be found in a CM controlled document for each product. To find the documentation for Tripwire, refer to the EMD Baseline Information System web page, URL http://pete.hitc.com/baseline/index.html.

4.4.2.4 Databases

Tripwire uses an internal data store of captured information. The user can update this data store through the command line interface. Reporting information based on the information Tripwire has gathered and placed in this data store is sent by email to the operator.

4.4.2.5 Special Constraints

None.

4.4.2.6 Outputs

Tripwire generates the outputs presented in Table 4.4.2-2 below in the filename specified on the command line invocation. A sample of the generated report is shown in Section 4.4.2.8.

Table 4.4.2-2. Tripwire Outputs

Output	Description and Format
Tripwire compares the new datastore with the existing Tripwire datastore stored on the file system, reporting added or deleted files, as well as those files that have changed.	See 4.4.2.8, the Report section, for a sample of Tripwire output.
Email to the operator.	Email messages list the files examined by Tripwire whose current signature does not match the file's entry in the signature file.
Updates to the Tripwire datastore.	The operator must review the email mentioned above and determine whether it represents a data corruption problem or the Tripwire signature datastore is out-of-date. If the determination is the data store is out of date, the operator must use Tripwire with the interactive update option and update the signature file.
Security problem notification.	If the operator determines the Tripwire email indicates a security violation the operator must log the problem.

4.4.2.7 Event and Error Messages

None.

4.4.2.8 Reports

Tripwire must be started from the command line interface to request the Tripwire report. A sample of Tripwire output is shown below in Figure 4.4.2-2.

```
2:30am (mentor) 985 % Tripwire
        ### Phase 1:   Reading configuration file
        ### Phase 2:   Generating file list
        ### Phase 3:   Creating file information database
        ### Phase 4:   Searching for inconsistencies
        ###
        ###                 Total files scanned:          82
        ###                     Files added:               0
        ###                     Files deleted:             0
        ###                     Files changed:            80
        ###
        ###                 After applying rules:
        ###                     Changes discarded:        79
        ###                     Changes remaining:         1
        ###
        changed: -rw------- genek 4433 Oct 13 02:30:34 1992 /tmp/genek/Tripwire-0.92/config.h
        ### Phase 5:   Generating observed/expected pairs for changed files
        ###
        ### Attr       Observed (what it is)        Expected (what it should be)
        ### ============================================================
        /tmp/genek/Tripwire-0.92/config.h
        st size: 4441                    4433
        md5 (sig1): 0aqL1O06C3Fj1YBXz3.CPdcb     0cPX1H.DYS.s1vZdKD.ELMDR
        snefru (sig2): 0PcgcK/MZvEm.8pIWe.Gbnn/     /8VoJv1JcoUA0NvoGN.k3P6E
        crc32 (sig3): .EHA6x                     /OuGNV
        crc16 (sig4): ...9/q                     ...6yu
        md4 (sig5): /hQ0sU.UEbJo.UR4VZ/mNG/h     .UR4VZ/mNG/h/VSG/W/Z643k
        md2 (sig6): .hLwjb.VRA0O.Z72y90xTYqA     1LR0Gg1l.vqB0.1g330Pi8/p
```

Figure 4.4.2-2. Tripwire Report (sample)

4.4.3 Cryptographic Management Interface (CMI)

The Cryptographic Management Interface (CMI) GUI program, EcSeAuthnProg, is used by operations personnel to generate a randomized username and password (though only the password is currently used) given a key. There is one key for each EMD server and is the same as the Program ID stored in a server's configuration file. This tool is most often used to generate passwords for Sybase and FTP user accounts. It is therefore recommended that access to this tool is restricted to Sybase and Unix System Administrators only.

CMI is used to perform the operator functions listed in Table 4.4.3-1.

Table 4.4.3-1. Common EMD Operator Functions Performed with CMI

Operating Function	Command / GUI	Description	When and Why to Use
Start *CMI* program.	*EcSeAuthnProg*	This brings up the *ConnectAuth* GUI.	In order to obtain the user password for a given application key.
Generate password.	*CMI Main Screen (ConnectAuth GUI)*	This causes the program to generate a randomized username and password.	This is only needed when an EMD server requires a new user account.

4.4.3.1 Quick Start Using CMI

The CMI Main Screen is a custom developed GUI utility and should be used only by operations personnel.

To execute CMI from the command line prompt, enter:

> **EcSeAuthnProg**

4.4.3.2 CMI Main Screen

Figure 4.4.3-1 is the CMI GUI Screen, which comes up when the CMI program is run. It contains three fields:

- Application Key field
- User Id field
- Password field

Operations personnel fill out the first field with the application key. In response, CMI returns a user name and password, which are displayed in the associated fields.

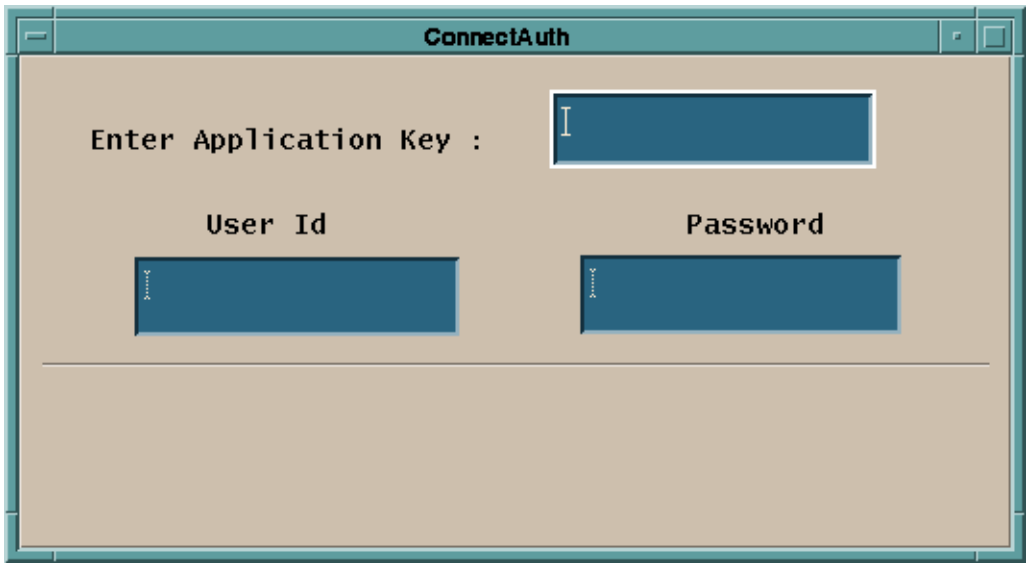


Figure 4.4.3-1. CMI Main Screen

Table 4.4.3-2 describes all the fields found in the CMI Screen in Figure 4.4.3-1.

Table 4.4.3-2. CMI Field Descriptions

Field Name	Data Type	Size	Entry	Description
Application Key	Integer	1 to 10 digits	Required	Key identifying an application.
User Id	Character	8	Generated by *EcSeAuthnProg* program	Displays the randomized user id based on the key (this field is not used).
Password	Character	8	Generated by *EcSeAuthnProg* program	Displays the password to be used when creating the account.

4.4.3.3 Required Operating Environment

The EcSeAuthnProg depends on a data file, which must be called “data” and must exist in the directory from which the tool is invoked. The data file is the same file as the EcSeRandomDataFile located in **$ECS_HOME/<mode>/CUSTOM/security,** only with a different name. CMI requires no other configuration files. The can run on a Linux 2.x platform.

4.4.3.3.1 Interfaces and Data Types

CMI utilizes no special data types or interfaces.

4.4.3.4 Databases

None.

4.4.3.5 Special Constraints

A data file called "**data**" must exist in the execution directory. The data file must be the same file as the EcSeRandomDataFile.

4.4.3.6 Outputs

All information is displayed on the CMI screen.

4.4.3.7 Event and Error Messages

The CMI program issues error messages, which are listed in Appendix A.

4.4.3.8 Reports

None.

This page intentionally left blank.